19456 Wax

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NIC # 19456

Packet Radio Temporary Note # 73

SELECTION OF 127 CHIP MAXIMAL LENGTH CODE FOR THE TEST SAWDS

1.0 PURPOSE

The purpose of this note is to document the results of the analysis that was done to select a 127 chip maximal length code for the test SAWDS. In this note, a computer program is listed that generates a desired length maximal length code. Also listed is a subroutine for studying discrete (chip by chip basis) correlation properties of the codes.

2.0 DESCRIPTION OF THE COMPUTER PROGRAM (Refer to Appendix B for Listing)

The main program CODCOR generates any desired length maximal length code. The code is printed out based on the following inputs:

a. Total number of shift register stages (7 stage shift register generator generates a $2^7 - 1 = 127$ chip length code. Refer to Appendix A for the background information on shift register generators.)

b. Total number of taps and their identification. (Refer to Table A1 in Appendix A for tap derivations for 127 chip codes.)

c. Initial 1 or 0 setting of each register stage (influences the code starting point of a specific sequence).

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The subroutine "COREL" computes the correlation between CP(M) and C(N), where CP(M) consists of M number of 1's and 0's corresponding to the signal, and C(N) consists of N number of 1's and 0's corresponding to the code*. The program is written for M = 2N, so that CP(M) may consist of a specific code sequence following or preceding another code sequence (or the same code sequence for autocorrelation). The resultant correlation of CP(M) with C(N), denoted by KR(J), consisting of J = (M + N) number of integers is printed out.

3.0 SELECTION OF THE 127 CHIP LENGTH CODE

As per the procedure outlined in Appendix A, eighteen different 127 chip maximal length codes can be generated using the program described above. These codes along with their autocorrelation are listed in Appendix C. In each case, the autocorrelation has three distinct sections; first section corresponds to the correlation as a result of the coded signal propagating across the decoder with nothing preceding the coded signal, second section represents the autocorrelation of the second coded bit preceded by the similarly coded first bit, and the third section is, of course, a mirror image of the first section when nothing follows the second bit. The program computes the mean and variance of the absolute value of correlation integers comprising each of the three sections of correlated output.

In order to optimize the peak to sidelobe level, Table I summarizes the mean and variance of the sidelobes as applicable to the specific starting point of each code sequence (with all initial shift register settings of 1 in each case). As a result, it seems that the code generated by 7, 3, 2, 1 taps has the best minimum mean and variance combination. This is the code that has been implemented on the test SAWDS.

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* It is, of course, assumed that 1's and 0's of the signal and 1's and 0's of the correlator represent identical waveforms.

TABLE I

TAPS	MEAN	VAR
7, 3	4.01	8.47
7, 4	3.69	9.61
7, 3, 2, 1	3.33	4.93
7, 6, 5, 4	3.74	7.38
7, 4, 3, 2	4.25	7.90
7, 5, 4, 3	3.67	5.28
7, 6, 5, 4, 2, 1	4.02	7.17
7, 6, 5, 3, 2, 1	3.66	7.59
7, 5, 4, 3, 2, 1	3.71	8.26
7, 6, 5, 4, 3, 2	3.52	8.33
7, 6, 4, 2	3.40	8.59
7, 5, 3, 1	3.74	8.40
7, 1	3.75	4.98
7, 6	3.17	10.28
7, 6, 3, 1	4.13	9.50
7, 6, 4, 1	3.79	9.88
7, 6, 5, 2	3.66	7.53
7, 5, 2, 1	3.58	8.96

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4.0 ADDITIONAL COMMENTS

A. Appendix D lists the correlated outputs of the code C followed or preceded by $\overline{C}$ (complement of C), or B (all 1's), or $\overline{B}$ (all zeros), etc. Perhaps the most noticeable observation is that the correlation with the carrier (B or $\overline{B}$) results into a considerably higher level of sidelobes. Although the listing provided in Appendix D is specifically for the 7, 3, 2, 1 code that we have selected, the above statement is applicable to all codes listed in Appendix C.

B. In case it is not already evident from the description thus far, it may be emphasized once again that this program is not limited to the generation of 127 chip length codes. Also the subroutine "COREL" is, of course, general enough that it is not limited to correlating only the maximal length codes.

C. The merit of this type of a program lies in the preliminary analysis of the codes.

APPENDIX A

GENERATION OF 127 CHIP MAXIMAL LENGTH CODES

For a 127 chip length code, we need irreducible polynomials of degree 7. Peterson* lists polynomials up to degree 34. The irreducible polynomials of degree 7 are the following (in octal form):

211; 217; 235; 367; 277; 325; 203; 313; 345.

Each digit in the above octal formulation represents three binary digits. The binary digits then are the coefficients of the polynomials, with the high-order coefficients at the left. For example, 211's binary equivalent is 010001001, and the corresponding polynomial is $X^7 + X^3 + 1$. The reciprocal polynomial, $1 + X^4 + X^7$, is also irreducible. Table A-1 lists a derivation of the required taps for the shift-register code generator. As an example, the binary shift-register generator to generate a maximal length sequence corresponding to the polynomial $X^7 + X^4 + 1$ is shown in Figure A1. An example of $X^7 + X^3 + X^2 + X^1 + 1$ is also shown.

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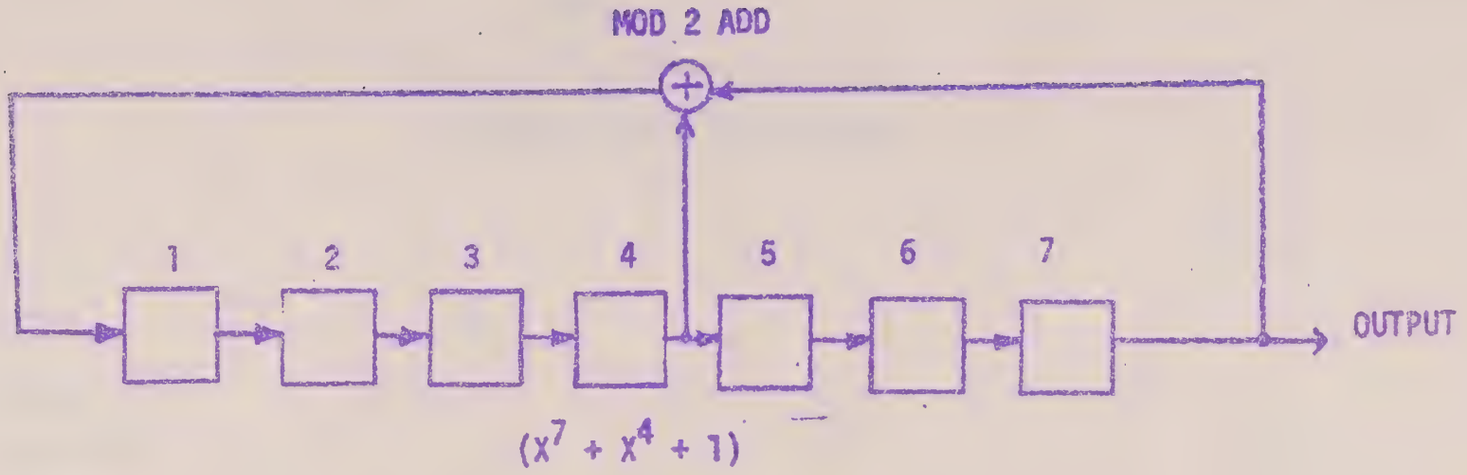
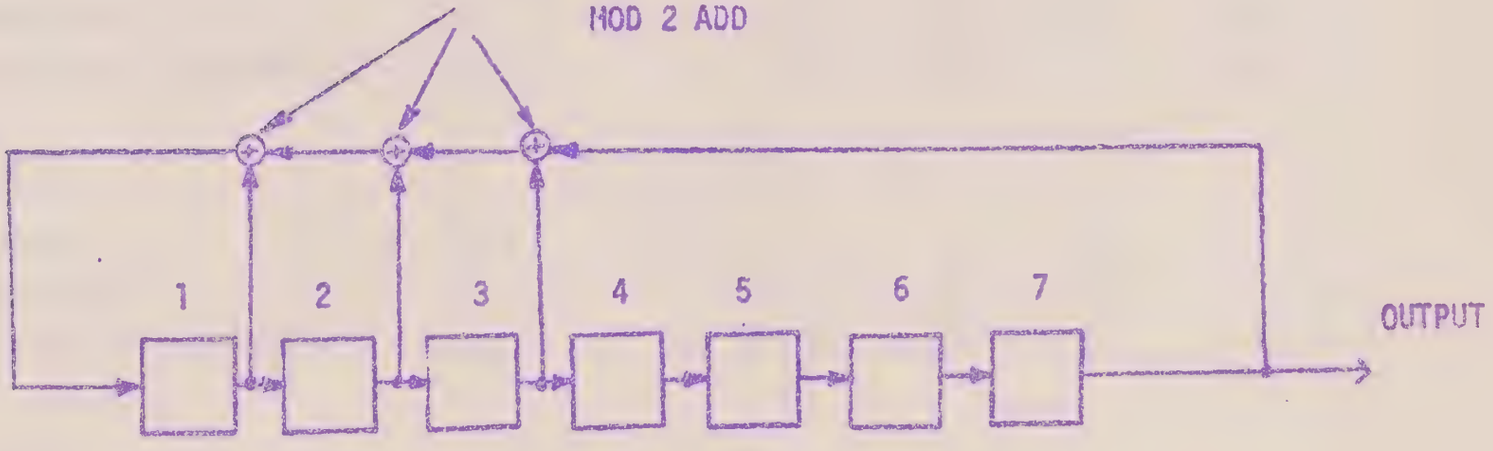
* Error correcting codes by W. W. Peterson, (M.I.T. Press)



$(X^7 + X^4 + 1)$

A SHIFT-REGISTER GENERATOR FOR A
127-MAXIMUM-LENGTH SEQUENCE (TAPS: 7, 4)



$(X^7 + X^3 + X^2 + X^1 + 1)$

A SHIFT-REGISTER GENERATOR FOR A
127-MAXIMUM-LENGTH SEQUENCE (TAPS: 7, 3, 2, 1)

NOTE: CODE STARTING SEQUENCE DEPENDS ON INITIAL STATES OF SHIFT REGISTERS

FIGURE-A1

TABLE-A1

TABLE OF TAP DERIVATIONS FOR THE SHIFT-REGISTER SEQUENCE

													TAPS
1)	OCTAL		2			1			1				
	BINARY	0	1	0	0	0	1	0	0	1			
	POLYNOMIAL		x^7				x^3			x^0			7, 3
	RECIPROCAL POLYNOMIAL		x^0				x^4			x^7			7, 4
2)	OCTAL		2			1			7				
	BINARY	0	1	0	0	0	1	1	1	1			
	POLYNOMIAL		x^7				x^3	x^2	x^1	x^0			7, 3, 2, 1
	RECIPROCAL POLYNOMIAL		x^0				x^4	x^5	x^6	x^7			7, 6, 5, 4
3)	OCTAL		2			3			5				
	BINARY	0	0	0	0	1	1	1	0	1			
	POLYNOMIAL		x^7			x^4	x^3	x^2		x^0			7, 4, 3, 2
	RECIPROCAL POLYNOMIAL		x^0			x^3	x^4	x^5		x^7			7, 5, 4, 3
4)	OCTAL		3			6			7				
	BINARY	0	1	1	1	1	0	1	1	1			
	POLYNOMIAL		x^7	x^6	x^5	x^4		x^2	x^1	x^0			7, 6, 5, 4, 2, 1
	RECIPROCAL POLYNOMIAL		x^0	x^1	x^2	x^3		x^5	x^6	x^7			7, 6, 5, 3, 2, 1
5)	OCTAL		2			7			7				
	BINARY	0	1	0	1	1	1	1	1	1			
	POLYNOMIAL		x^7		x^5	x^4	x^3	x^2	x^1	x^0			7, 5, 4, 3, 2, 1
	RECIPROCAL POLYNOMIAL		x^0		x^2	x^3	x^4	x^5	x^6	x^7			7, 6, 5, 4, 3, 2
6)	OCTAL		3			2			5				
	BINARY	0	1	1	0	1	0	1	0	1			
	POLYNOMIAL		x^7	x^6		x^4		x^2		x^0			7, 6, 4, 2
	RECIPROCAL POLYNOMIAL		x^0	x^1		x^3		x^5		x^7			7, 5, 3, 1

Table-A1 (Continued)

												TAPS
7)	OCTAL		2			0			3			
	BINARY	0	1	0	0	0	0	0	1	1		
	POLYNOMIAL		x^7						x^1	x^0		7, 1
	RECIPROCAL POLYNOMIAL		x^0						x^6	x^7		7, 6
8)	OCTAL		3			1			3			
	BINARY	0	1	1	0	0	1	0	1	1		
	POLYNOMIAL		x^7	x^6			x^3		x^1	x^0		7, 6, 3, 1
	RECIPROCAL POLYNOMIAL		x^0	x^1			x^4		x^6	x^7		7, 6, 4, 1
9)	OCTAL		3			4			5			
	BINARY	0	1	1	1	0	0	1	0	1		
	POLYNOMIAL		x^7	x^6	x^5			x^2		x^0		7, 6, 5, 2
	RECIPROCAL POLYNOMIAL		x^0	x^1	x^2			x^5		x^7		7, 5, 2, 1

APPENDIX B

BD FND COOLOK,COOKOK
UNIVAC 1100 FORTRAN V LEVEL 2206 0023
THIS COMPILATION WAS DONE ON 05 OCT 73 AT 19:03:27

05 OCT 73 19:03:27.258

MAIN PROGRAM

STORAGE USED (BLOCK, NAME, LENGTH)

0001	*CODE	000373
0000	*DATA	000004
0002	*BLANK	001605

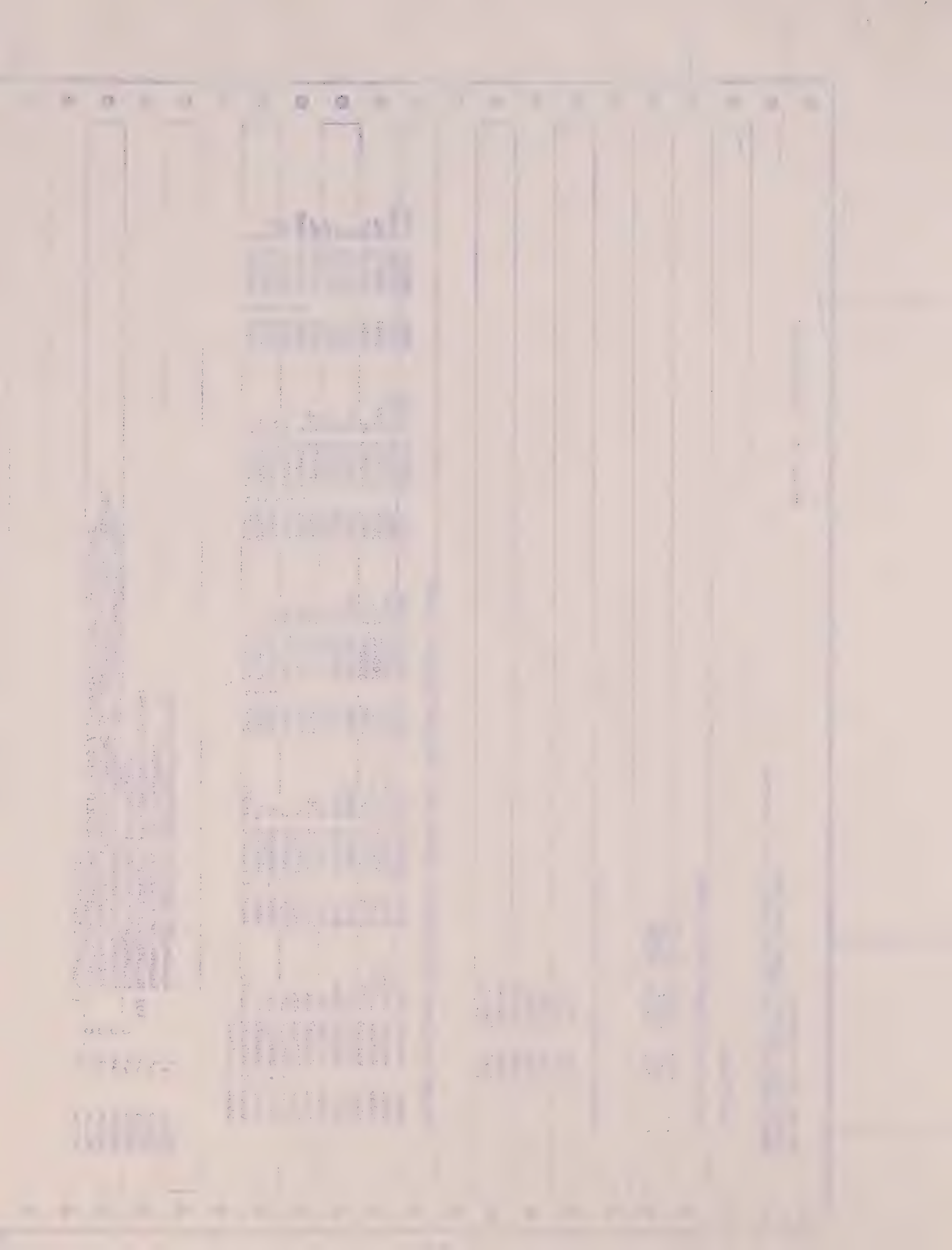
EXTERNAL REFERENCES (BLOCK, NAME)

0003	COREL
0004	NRWD$
0005	NIOI$
0006	NIOO$
0007	NEAP1$
0010	NEAP2$
0011	NRWD$
0012	NSTOP$

STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000		000474	IF	0001		000211	I0L	0001		000367	I00L	0001		000257	I001L
0001		000301	I003L	0000		000501	I005F	0000		000510	I006F	0000		000517	I007F
0000		000561	I009F	0001		000000	I01L	0001		000213	I1L	0001		000013	I106
0001		000103	I056	0001		000041	I6L	0001		000314	I7L	0001		000033	I2L
0000		000537	I2F	0001		000215	I220	0001		000022	I227G	0001		000232	I237G
0001		000035	I006	0001		000552	I317G	0001		000043	I4L	0000		000477	I5F
0000		000000	IF	0001		000070	I6L	0001		000132	I84L	0001		000133	I82L
0001		000147	I4L	0001		000196	I85L	0001		000157	I86L	0001		000172	I87L
0001		000202	I9L	0001		000206	I9L	0001		000203	I90L	0002	R	000001	C
0000	R	000021	IP	0000	I	000456	I	0000	I	000457	JA	0000	I	000460	JA
0000	I	000465	JD	0000	I	000463	JE	0000	I	000464	JF	0000	I	000455	JI
0000	I	000472	A	0002		000705	KR	0000	I	000454	N	0002	I	000000	NP
0000	R	000372	REGTW	0000	R	000000	REGTB	0000	R	000466	S	0000	R	000467	T
0000	R	000471	V												

00101	10			DIMENSION REGTK(50),CHAR(200),REGTO(50)
00103	40			COMMON I#,C(200),CP(300),KR(400)
00104	50		101	READ(5,1,END=1001) N,NJT,(REGTK(I),I=1,N)
00104	60	C		N=NUMBER OF STAGES IN REGISTER
00104	70	C		REGTK(I) REPRESENTS THE INITIAL 1 OR 0 IN EACH REGISTER STAGE.
00104	80	C		INITIAL REGISTER STAGES CANNOT BE ALL ZEROS FOR A MAXIMAL LENGTH.
00104	90	C		A N STAGE REGISTER RESULTS INTO A 2**N-1=NP CHIP LENGTH CODE
00114	00			1 FORMAT(2I5,10F5.0)



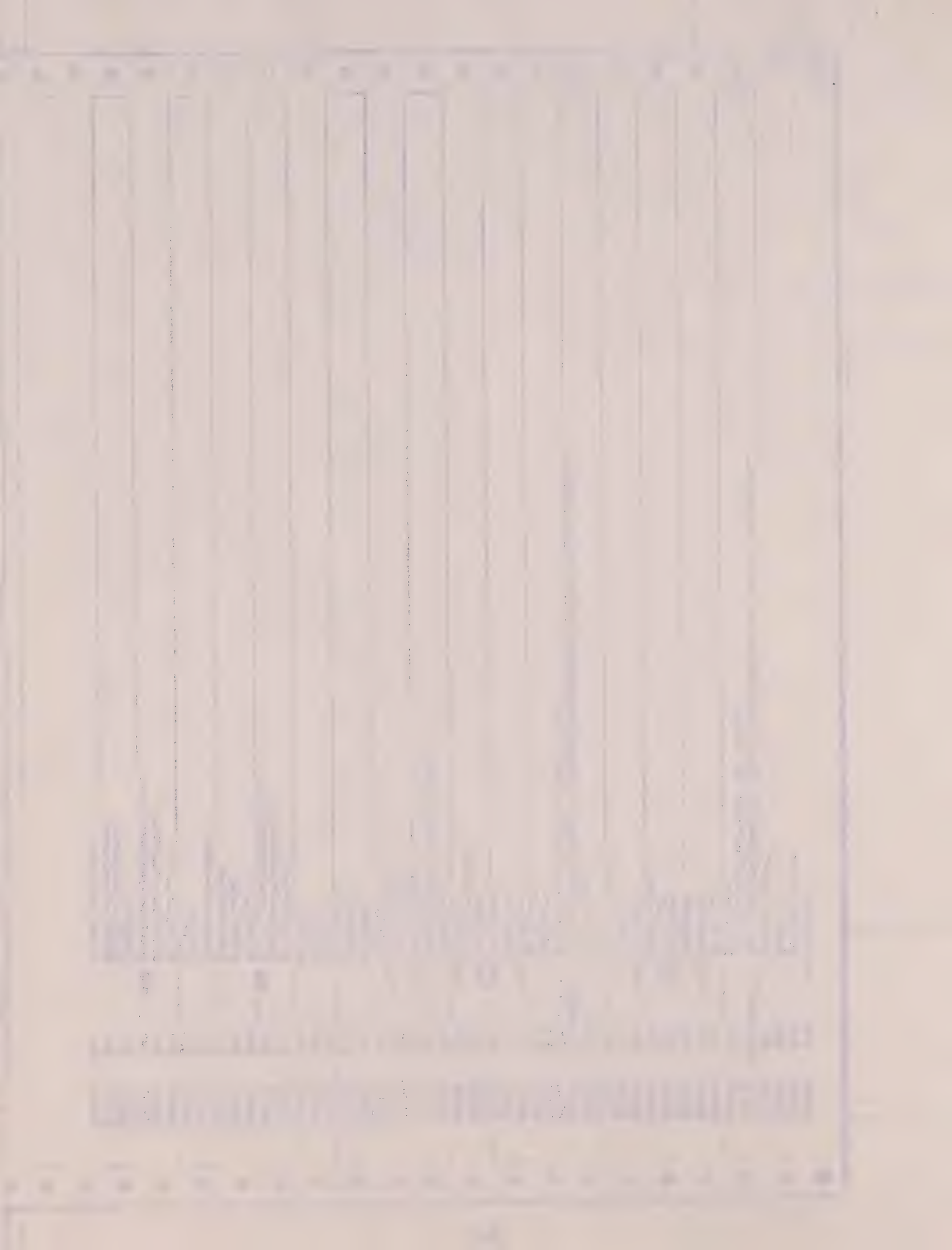
```
00115    9*          IF(JT.EQ.2) GO TO 2
00117   16*          IF(JT.EQ.4) GO TO 4
00121   11*          IF(JT.EQ.6) GO TO 6
00123   12*        2 READ(6,3) JA, JB
00127   13*        3 FORMAT(2I5)
00130   14*          GO TO 8
00131   15*        4 READ(6,5) JA,JB,JC,JD
00135   16*        5 FORMAT(4I5)
00140   17*          GO TO 8
00141   18*        6 READ(6,7) JA,JB,JC,JD,JE,JF
00145   19*        7 FORMAT(6I5)
00152   20*        8 CALL SECOND(N)
00153   21*          NPASS=1
00156   22*          DO 14 J=2,NP
00157   23*     THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00157   23*          IF(REGTR(JA).EQ.REGTR(JB)) GO TO 81
00161   24*          K=1.
00162   25*          GO TO 82
00163   26*       81 K=0.
00164   27*       82 IF(JT.EQ.2) GO TO 10
00166   28*     THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00166   28*          IF(REGTR(JC).EQ.REGTR(JD)) GO TO 83
00170   29*          S=1.
00171   30*          GO TO 84
00172   31*       83 S=0.
00173   32*     THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00173   32*       84 IF(K.EQ.S) GO TO 85
00175   33*          T=1.
00176   34*          GO TO 86
00177   35*       85 T=0.
00200   36*       86 IF(JT.EQ.4) GO TO 9
00202   37*     THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00202   37*          IF(REGTR(JE).EQ.REGTR(JF)) GO TO 87
00204   38*          U=1.
00205   39*          GO TO 88
00206   40*       87 U=0.
00207   41*     THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00207   41*       88 IF(T.EQ.U) GO TO 89
00211   42*          V=1.
00212   43*          GO TO 90
00213   44*       89 V=0.
00214   45*       90 REGTR(1)=V
00215   46*          GO TO 11
00216   47*        9 REGTR(1)=T
00217   48*          GO TO 11
00220   49*       10 REGTR(1)=R
00221   50*       11 DO 12 K=2,N
00224   51*       12 REGTR(K)=REGTR(K-1)
00226   52*          GO TO 13
00231   53*       15 REGTR(K)=REGTR(K)
00233   54*          CALL SECOND(N)
00234   55*       14 CONTINUE
00236   56*          DO 16 I=1,NP
00240   57*     THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00240   57*          IF(C(I).EQ.0.) GO TO 15
00243   58*          COMM(I)=0.
```

```
00244   59*         GO TO 10
00245   60*      15 CHAR(I)=1.
00246   61*      10 CONTINUE
00247   62*         JJ1=JJ/2
00250   63*         GO TO (1001,1002,1003),JJT
00252   64*   1001 WRITE(7,1005) JA,JB
00256   65*         GO TO 17
00257   66*   1002 WRITE(7,1000) JA,JB,JC,JD
00265   67*         GO TO 17
00266   68*   1003 WRITE(7,1007) JA,JB,JC,JD,JE,JF
00274   69*   2005 FORMAT(1H1,'     TAP NUMBERS ARE ',215,//)
00277   70*   1002 FORMAT(1H1,'     TAP NUMBERS ARE ',415,//)
00300   71*   1007 FORMAT(1H1,'     TAP NUMBERS ARE ',615,//)
00301   72*      17 WRITE(7,1006)
00303   73*   1006 FORMAT(1X,'   THE FOLLOWING IS THE CODE',///)
00304   74*         WRITE(7,20) (CHAR(I),I=1,P)
00314   75*      20 FORMAT(1X,80A1)
00315   76*         WRITE(7,21)
00316   77*      21 FORMAT(1X,///)
00320   78*         DO 31 I=1,P
00321   79*         CHAR(I)=C(I)
00322   80*      31 CHAR(P+1)=C(I)
00326   81*         WRITE(7,1009)
00330   82*   1009 FORMAT(1X,'   CC/C    CORRELATION',///)
00337   83*         CALL CORCL
00340   84*         GO TO 101
00341   85*    100 CONTINUE
00342   86*         STOP
00343   87*         END

END OF UNIVAC 1100 FORTRAN V COMPILATION.   0 *DIAGNOSTIC* MESSAGE(S)
```

```
@D FIL COREL.COREL                                        03 OCT 73   19:03:28.974
UNIVAC 1100 FORTRAN V LEVEL 2206 0823
THIS COMPILATION WAS DONE ON 05 OCT 73 AT 19:03:29

   SUBROUTINE COREL     ENTRY POINT 000511

   STORAGE USED (BLOCK, NAME, LENGTH)

        0001   *CODE   000525
        0000   *DATA   000185
        0002   *BLANK  001005

   EXTERNAL REFERENCES (BLOCK, NAME)

        0003   NBUCS
        0004   NIOCI
        0005   NIOCO
        0006   NLNK3A

   STORAGE ASSIGNMENT FOR VARIABLES (BLOCK, TYPE, RELATIVE LOCATION, NAME)

   0001   000025 105G     0001   000051 110L     0001   000041 111G     0001   000054 120L     0001   000073 130G
   0001   000076 134G     0001   000134 154G     0001   000150 160G     0001   000212 201G     0001   000106 210L
   0001   000111 224L     0001   000265 224G     0001   000321 225G     0001   000595 251G     0001   000150 310L
   0001   000163 321L     0000   000051 500F     0000   000052 501F     0000   000034 502F     0000   000043 503F
   0000   000045 504F     0000   000054 505F     0000   000056 506F     0000   000065 507F     0000   000067 508F
   0000   000076 509F     0002 R 000001 C        0002 R 000311 CP       0000 I 000000 I        0000   000106 INJPB
   0000 I 000004 J        0000 I 000002 K        0002 I 000765 KK       0000 I 000005 NA       0000 I 000006 NB
   0000 I 000007 NC       0000 I 000010 ND       0000 I 000011 NE       0002 I 000000 NP       0000 I 000004 NX
   0000 I 000005 NY       0000 R 000001 SUM      0000 R 000015 SUMA     0000 R 000021 SUMB     0000 R 000025 SUMC
   0000 R 000012 SUMX     0000 R 000013 SUMY     0000 R 000016 XMA      0000 R 000022 XMB      0000 R 000026 XMC
   0000 R 000017 XMSA     0000 R 000023 XMSB     0000 R 000027 XMSC     0000 R 000020 XVARA    0000 R 000024 XVARB
   0000 R 000030 XVARC

00101      10          SUBROUTINE COREL
00102      20          COMMON NP,C(200),CP(300),KK(400)
00104      30      101 DO 200 I=1,NP
00107      40          SUM=0
00110      50          DO 130 K=1,I
00113   *WARNING 68*   THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00113      60          IF(C(K).EQ.CP(I*NP-I+K)) GO TO 110
00115      70          SUM=SUM-1
00116      80          GO TO 120
00117      90      110 CONTINUE
00120     100          SUM=SUM+1
00121     110      120 CONTINUE
00122     120      130 CONTINUE
00124     130          XK(I)=SUM
```

```
00125    14*      200 CONTINUE
00127    15*          DO 300 I=1,NP
00132    16*          SUM=0
00133    17*          DO 250 K=1,NP
00136    18*C NOTE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00136    19*          IF(C(K).EQ.CP(NP-I+K)) GO TO 210
00140    20*          SUM=SUM-1
00141    21*          GO TO 220
00142    22*      210 CONTINUE
00143    23*          SUM=SUM+1
00144    24*      220 CONTINUE
00145    25*      250 CONTINUE
00147    26*          KR(NP+1)=SUM
00150    27*      300 CONTINUE
00152    28*          NTEM=NP-1
00153    29*          DO 400 I=1,NTEM
00156    30*          SUM=0
00157    31*          DO 350 K=1,I
00162    32*C NOTE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00162    33*          IF(CP(K).EQ.C(I-P-I+K)) GO TO 310
00164    34*          SUM=SUM-1
00165    35*          GO TO 320
00166    36*      310 CONTINUE
00167    37*          SUM=SUM+1
00170    38*      320 CONTINUE
00171    39*      350 CONTINUE
00173    40*          KR(3**NP-I)=SUM
00174    41*      400 CONTINUE
00176    42*          NA=3**NP-1
00177    43*          WRITE(7,500) (KR(I),I=1,NX)
00203    44*      500 FORMAT(20I6)
00206    45*          WRITE(7,501)
00210    46*      501 FORMAT(1X,//)
00211    47*          NA=NP-1
00212    48*          NB=NP+1
00213    49*          NC=2*NP-1
00214    50*          ND=3*NP
00215    51*          SUMX=0.
00217    52*          SUMY=0.
00220    53*          DO 401 J=1,NA
00223    54*          SUMX=SUMX+IABS(KR(J))
00224    55*      401 SUMY=SUMY+IABS(KR(J))**2
00226    56*          SUMA=SUMX
00227    57*          XMA=SUMX/NA
00230    58*          XVMA=SUMY/NA
00231    59*          XVMA=XVMA-XMA**2
00232    60*          SUMX=0.
00233    61*          SUMY=0.
00234    62*          DO 402 J=NB,NC
00237    63*          SUMX=SUMX+IABS(KR(J))
00240    64*      402 SUMY=SUMY+IABS(KR(J))**2
00242    65*          SUMB=SUMX
00243    66*          XMB=SUMX/(NC-NB+1)
00244    67*          XVMB=SUMY/(NC-NB+1)
00246    68*          XVMB=XVMB-XMB**2
```

B-5



```
00246   005         SUMX=0.
00247   006         SUMY=0.
00250   007         DO 403 J=NN+1,NE
00251   008         SUMX=SUMX+(AUS(KR(J))
00254   009     403 SUMY=SUMY+(AUS(KR(J))**2
00256   010         SUMC=SUMX
00257   011         XMC=SUMA/(NE-NU)
00260   012         XMSC=SUMY/(NE-NU)
00261   013         XVARC=XMSC-XMC**2
00262   014         WRITE(7,502)
00264   015     502 FORMAT(1X,'     SUM1        SUM2        SUM3')
00265   016         WRITE(7,503) SUMA,SUMB,SUMC
00272   017     503 FORMAT(3F10.2//)
00273   018         WRITE(7,504)
00275   019     504 FORMAT(1X,'     MEAN1       MEAN2       MEAN3')
00276   020         WRITE(7,505) XMA,XMB,XMC
00303   021     505 FORMAT(3F10.2//)
00304   022         WRITE(7,506)
00306   023     506 FORMAT(1X,'     MS1         MS2         MS3')
00307   024         WRITE(7,507) XMSA,XMSB,XMSC
00314   025     507 FORMAT(3F10.2//)
00315   026         WRITE(7,508)
00317   027     508 FORMAT(1X,'     VAR1        VAR2        VAR3')
00320   028         WRITE(7,509) XVARA,XVARB,XVARC
00325   029     509 FORMAT(3F10.2//)
00326   030         RETURN
00327   031         END

      END OF UNIVAC 1108 FORTRAN V COMPILATION.     0 *DIAGNOSTIC* MESSAGE(S)

ON AUF COUGAR                                   05 OCT 73   19:03:30.886
```

APPENDIX C

TAP NUMBERS ARE 7 3

THE FOLLOWING IS THE CODE

1. 1. 1. 1. 1. 1. 1. 0. 0. 0. 1. 1. 1. 0. 1. 1. 0. 0. 0. 1.
0. 1. 0. 0. 1. 0. 1. 1. 1. 1. 1. 0. 1. 0. 1. 0. 1. 0. 0. 0.
0. 1. 0. 1. 1. 0. 1. 1. 1. 1. 0. 0. 1. 1. 1. 0. 0. 1. 0. 1.
0. 1. 1. 0. 0. 1. 1. 1. 0. 0. 0. 0. 1. 1. 0. 1. 1. 0. 1. 0.
1. 1. 1. 0. 1. 0. 1. 0. 0. 1. 1. 0. 0. 1. 0. 0. 0. 1. 0. 0.
0. 0. 0. 1. 0. 0. 1. 0. 0. 1. 1. 0. 1. 0. 0. 0. 1. 1. 1. 0.
1. 1. 1. 0. 0. 0. 0.

CC/L CORRELATION

-1 -2 -3 -4 -3 -2 -1 0 3 6 7 4 -1 -4 1 0 3 -2 -1 2
4 0 -3 0 -5 0 -5 -10 -7 -8 -7 -6 -3 -6 -1 8 -5 2 9 -8
7 -2 1 -6 5 -4 -5 -4 1 4 -1 -2 9 -2 -3 -8 1 8 5 -8
-5 -8 -9 6 7 4 7 -6 -9 -2 7 4 1 -10 1 0 -5 -2 3 2
3 -0 7 -2 1 -9 5 -10 1 4 -9 0 5 2 5 6 7 6 9 4
-1 4 -1 2 -1 -10 -3 0 1 -9 -1 -2 3 0 -5 -8 -7 -4 -1 0
1 2 3 2 1 0 127 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 0 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -2 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -2 -1 -1 -2 -1 -1 -1 -1 -1 -1 -1 127 0 1 2 3 2 1
0 -1 -4 -7 -6 -5 -4 -3 -2 -1 -4 1 0 -3 -10 -1 2 -1 4 -1
4 3 6 7 6 5 2 5 0 -9 -4 1 -10 5 -8 1 -2 7 -6 3
2 3 -2 -5 0 1 -10 1 4 7 -2 -9 -6 7 4 7 -8 -9 -8 -5
-0 5 0 1 -8 -5 -2 -9 -2 -1 -4 1 -4 -3 -4 5 -8 1 -2 7
-0 -4 -2 -5 -8 -1 -6 -3 -6 -7 -8 -7 -10 -5 0 -5 0 -3 0 9
2 -1 -2 3 0 1 -4 -1 4 7 6 3 0 -1 -2 -3 -4 -3 -2 -1

SUM1	SUM2	SUM3
505.00	126.00	505.00

MEAN1	MEAN2	MEAN3
4.01	1.00	4.01

MS1	MS2	MS3
24.53	1.00	24.53

VAR1	VAR2	VAR3
0.47	.00	0.47

TAP NUMBERS ARE 1 4

THE FOLLOWING IS THE COEF

1.	1.	1.	1.	1.	1.	1.	0.	0.	0.	0.	1.	1.	1.	0.	1.	1.	1.	1.	0.
0.	1.	0.	1.	1.	0.	0.	1.	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.	0.	0.
0.	1.	0.	0.	1.	1.	0.	0.	0.	1.	0.	1.	1.	1.	0.	1.	0.	1.	1.	0.
1.	1.	0.	0.	0.	0.	0.	1.	1.	0.	0.	1.	1.	0.	1.	0.	1.	0.	0.	1.
1.	1.	0.	0.	1.	1.	1.	1.	0.	1.	1.	0.	1.	0.	0.	0.	0.	1.	0.	1.
0.	1.	0.	1.	1.	1.	1.	1.	0.	1.	0.	0.	1.	0.	1.	0.	0.	0.	1.	1.
0.	1.	1.	1.	0.	0.	0.													

CC/C CORRELATION

-1	-2	-3	-4	-1	0	-1	2	5	6	3	-2	-5	-6	-3	-4	-1	-4	-1	2
0	-1	-2	-3	1	0	1	-2	-1	-2	-3	-2	-1	-4	-1	0	-5	0	0	-2
11	-4	-7	-4	-7	0	-1	-2	-1	-2	-3	-4	-9	-4	-9	-8	-1	-8	-9	-14
-1	-8	-9	-6	-5	0	-3	-10	-9	-2	-7	-8	-3	-10	-3	-2	-3	-0	-1	-0
-1	-8	-3	-6	-5	-12	-3	-10	-1	-4	-9	-0	-3	-0	-1	-2	-1	-0	-1	-2
-4	-6	-7	-4	-3	-10	-5	-8	-3	-0	-5	-2	-5	-4	-1	-4	-7	-4	-3	-0
-1	-1	-1	-1	-1	-1	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	1	2	1	0	-1
0	-1	-0	-1	-4	-1	-4	-0	-2	-3	-0	-1	-0	-3	-10	-3	-2	-7	-2	-9
2	-1	-0	-1	2	-1	4	-0	-0	-9	-0	-4	-1	-10	-3	-12	-5	-8	-3	-8	-11
-1	-1	-0	-3	2	-3	-10	-5	-8	-7	-2	-9	-10	-3	-0	-5	-8	-9	-6	-11
-4	-4	-0	-1	-8	-4	-4	-9	-4	-3	-2	-1	-2	-1	-0	-7	-4	-7	-4	-11
-2	-1	-4	-1	-4	-0	-0	-0	-2	-3	-6	-5	-2	-1	-0	-1	-2	-3	-2	-1

SUM1	SUM2	SUM3
455.00	126.00	455.00
MEAN1	MEAN2	MEAN3
3.09	1.00	3.09
MS1	MS2	MS3
23.23	1.00	23.23
VAR1	VAR2	VAR3
9.01	0.00	9.01

TAP NUMBERS ARE 7 3 2 1

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	1.	1.	1.	0.	1.	0.	1.	1.	1.	1.	1.	0.
1.	0.	0.	0.	1.	0.	0.	0.	1.	1.	0.	0.	1.	1.	0.	1.	1.	0.	0.	0.	1.
1.	1.	0.	0.	1.	1.	1.	0.	1.	0.	1.	1.	1.	0.	0.	0.	0.	1.	0.	0.
1.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.	1.	0.	1.	0.	0.	1.
0.	0.	1.	0.	0.	1.	1.	1.	1.	1.	0.	0.	1.	0.	0.	0.	1.	1.	1.	0.
1.	0.	1.	0.	0.	0.	0.													

CC/C CORRELATION

-1	-2	-3	-4	-3	-4	-3	-2	-1	0	-1	-4	-1	-4	1	-8	-3	-2	-1	2
-7	6	5	-2	3	0	3	-8	1	-6	-1	-4	1	2	1	-2	1	-4	-7	4
5	-8	5	2	-5	2	-7	-8	3	2	-1	2	-3	-6	-1	-8	-5	4	-5	2
-3	-6	-5	4	7	4	-3	4	-5	4	7	0	5	2	-3	0	-3	-4	7	6
-3	4	-3	-6	7	-4	-5	6	3	-2	1	-2	-5	-2	3	0	5	-2	7	-4
-1	-4	1	-6	-7	6	-3	0	1	2	7	-2	3	0	3	0	-1	0	1	2
3	2	3	4	1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	1	2	3	2	3
2	1	0	-1	0	3	0	3	-2	7	2	1	0	-3	6	-7	-6	1	-4	-1
-4	7	-2	6	2	3	-2	-3	-2	1	-2	-3	6	-5	-4	7	-6	-3	4	-3
6	7	-4	-3	0	-3	2	5	0	7	4	-5	4	-3	4	7	4	-5	-6	-5
2	-3	6	-6	-8	-1	-6	-3	2	-1	2	3	-8	-7	2	-3	2	5	-8	3
4	-7	-4	1	-2	1	2	1	-4	-1	-6	1	-8	3	0	3	-2	5	6	-7
2	-6	-2	-3	-8	1	-4	-1	4	-1	0	-1	-2	-3	-4	-3	-4	-3	-2	-1

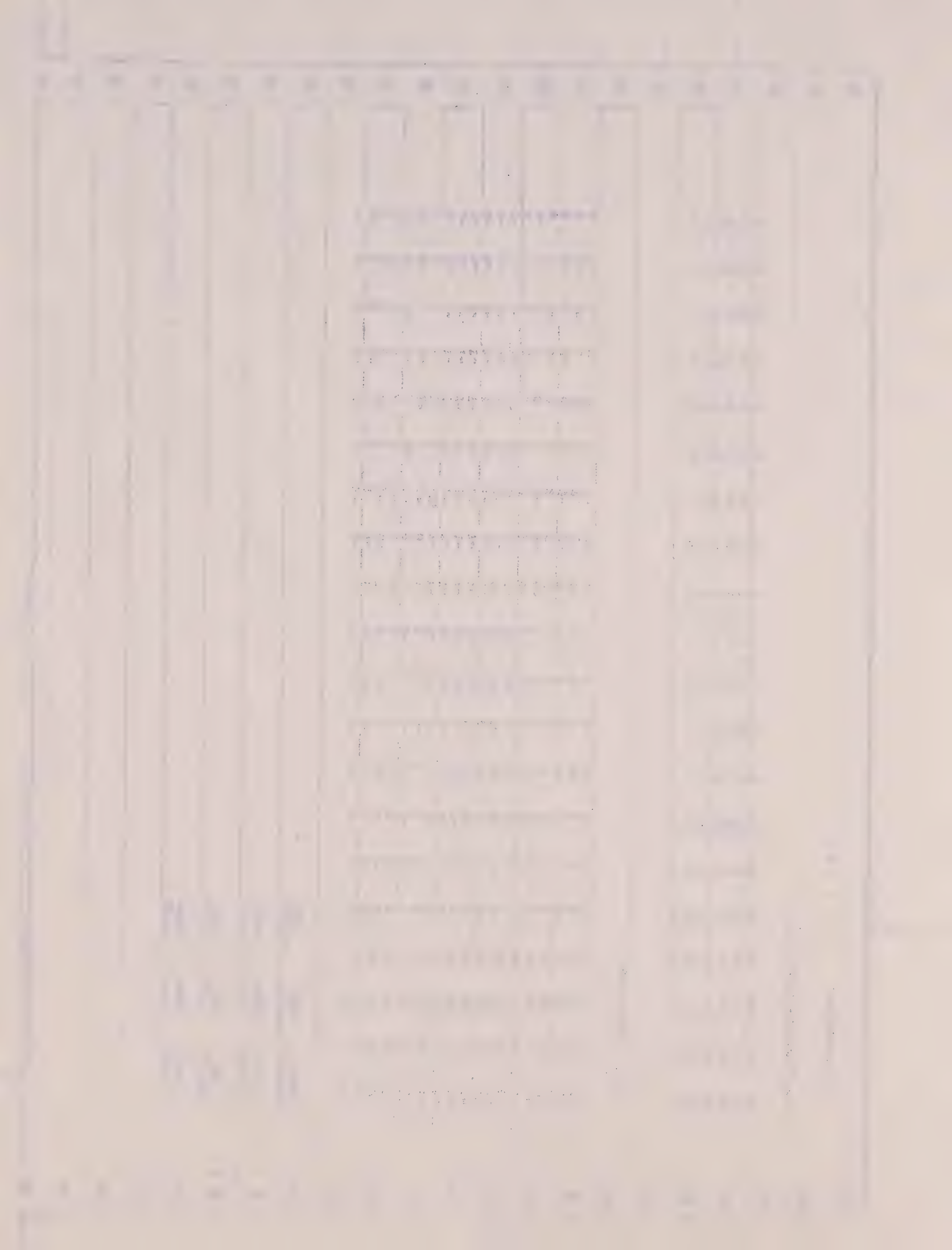
SUM1	SUM2	SUM3
619.00	1260.00	1879.00

MEAN1	MEAN2	MEAN3
5.55	1.00	5.55

MS1	MS2	MS3
15.99	1.00	15.99

VAR1	VAR2	VAR3
4.93	.00	4.93

C-3



TAP NUMBERS ARE 7 6 5 4

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	0.	0.	0.	1.	0.	1.	0.	1.	1.	0.	0.	0.
1.	0.	0.	1.	1.	1.	1.	0.	0.	1.	0.	1.	0.	0.	1.	0.	0.	1.	0.	1.
1.	0.	1.	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	1.	0.	0.	1.	0.	0.	0.
0.	1.	1.	1.	0.	1.	0.	1.	1.	1.	0.	0.	1.	1.	1.	0.	0.	0.	1.	1.
0.	1.	1.	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	1.	1.	1.
1.	1.	0.	1.	0.	0.	1.	1.	0.	1.	0.	0.	0.	1.	0.	0.	0.	1.	1.	1.
1.	1.	0.	1.	1.	1.	0.													

CC/C CORRELATION

-1	0	1	2	1	2	3	4	3	2	1	2	3	0	5	-5	-1	-2	-3	-2
-9	4	1	-2	1	2	7	-6	5	2	3	2	3	2	1	-6	-5	-10	-13	-2
-1	-10	5	2	-1	6	-3	-4	7	4	1	2	-1	0	3	-6	-5	6	-3	4
-7	-10	-7	6	9	0	-5	2	-7	4	7	-4	-1	0	-3	-2	-5	-8	3	2
-7	0	-5	-6	9	0	1	12	9	4	5	-2	-3	-4	-3	-4	-3	-6	5	-6
-3	-2	1	-2	-5	8	1	4	1	0	3	-6	-1	-4	-5	-2	-3	-4	-5	-4
-1	-2	-3	-2	-1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	-1	-2	-3	-2	-3
-4	-3	-4	-3	-2	-3	-4	-1	-6	3	0	1	4	1	0	-5	-2	1	-2	-3
-6	5	-6	-3	-4	-3	-4	-3	-2	5	4	9	12	1	0	9	-6	-3	0	-7
2	3	-8	-5	-2	-3	0	-1	-4	7	4	-7	2	-5	6	9	6	-7	-10	-7
4	-3	9	-5	-9	3	0	-1	2	1	4	7	-4	-3	6	-1	2	5	-10	-1
-2	-13	-10	-5	-6	1	2	3	2	3	2	5	-6	7	2	1	-2	1	6	-9
-2	-5	-2	-1	-4	5	0	3	2	1	2	3	4	3	2	1	2	1	0	-1

SUM1	SUM2	SUM3
471.00	120.00	471.00
MEAN1	MEAN2	MEAN3
3.74	1.00	3.74
MS1	MS2	MS3
21.36	1.00	21.36
VAR1	VAR2	VAR3
7.30	.00	7.30

TAP NUMBERS ARE 7 4 3 2

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.	0.	1.	1.
0.	0.	0.	0.	0.	1.	1.	1.	0.	1.	0.	0.	0.	0.	1.	0.	0.	1.	1.	1.
0.	0.	0.	1.	1.	0.	1.	0.	0.	1.	0.	0.	1.	0.	1.	1.	1.	0.	1.	1.
0.	1.	1.	1.	0.	0.	1.	1.	0.	1.	1.	0.	0.	1.	0.	1.	0.	1.	1.	0.
1.	0.	1.	1.	1.	1.	1.	0.	1.	1.	1.	1.	0.	0.	0.	0.	1.	1.	0.	0.
0.	1.	0.	0.	0.	1.	0.	1.	0.	0.	1.	1.	0.	0.	1.	1.	1.	1.	0.	1.
0.	1.	0.	1.	0.	0.	0.													

CC/C CORRELATION

-1	-2	-3	-2	-3	-2	-3	0	1	2	1	4	7	4	5	4	5	-2	-3	-2
-5	0	-5	-4	-3	2	-7	-8	1	-6	5	-2	-1	-8	7	2	1	6	3	2
1	12	3	0	9	2	11	0	7	4	-3	-8	-9	2	5	4	-7	-8	-5	8
-9	-6	5	-6	5	8	-5	4	7	6	-5	-6	-3	8	7	2	-9	-8	-1	-12
-3	-10	-1	-4	-13	-2	-3	-4	-7	-2	-3	-8	7	0	1	-6	5	-2	7	6
-3	2	3	4	-7	4	1	2	1	-6	-5	-6	-5	-8	-5	-2	-3	-2	-1	2
1	2	1	2	1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	1	2	1	2	1
2	-1	-2	-3	-2	-5	-8	-3	-6	-5	-6	1	2	1	4	-7	4	3	2	-3
0	7	-2	5	-6	1	0	7	-8	-3	-2	-7	-4	-3	-2	-13	-4	-1	-15	-3
-12	-1	-8	-5	2	7	8	-3	-6	-5	6	7	4	-5	8	5	-5	5	-5	-9
4	-5	-8	-7	4	5	2	-9	-8	-3	4	7	9	11	2	9	8	3	12	1
2	3	6	1	2	7	-8	-1	-2	5	-6	1	-8	-7	2	-3	-4	-3	6	-5
-2	-2	-2	5	4	5	4	7	4	1	2	1	8	-3	-2	-3	-2	-3	-2	-1

SUM1	SUM2	SUM3
535.00	120.00	535.00

MEAN1	MEAN2	MEAN3
4.25	1.00	4.25

MS1	MS2	MS3
25.93	1.00	25.93

VAR1	VAR2	VAR3
7.90	.00	7.90

TAP NUMBERS ARE 7 5 4 3

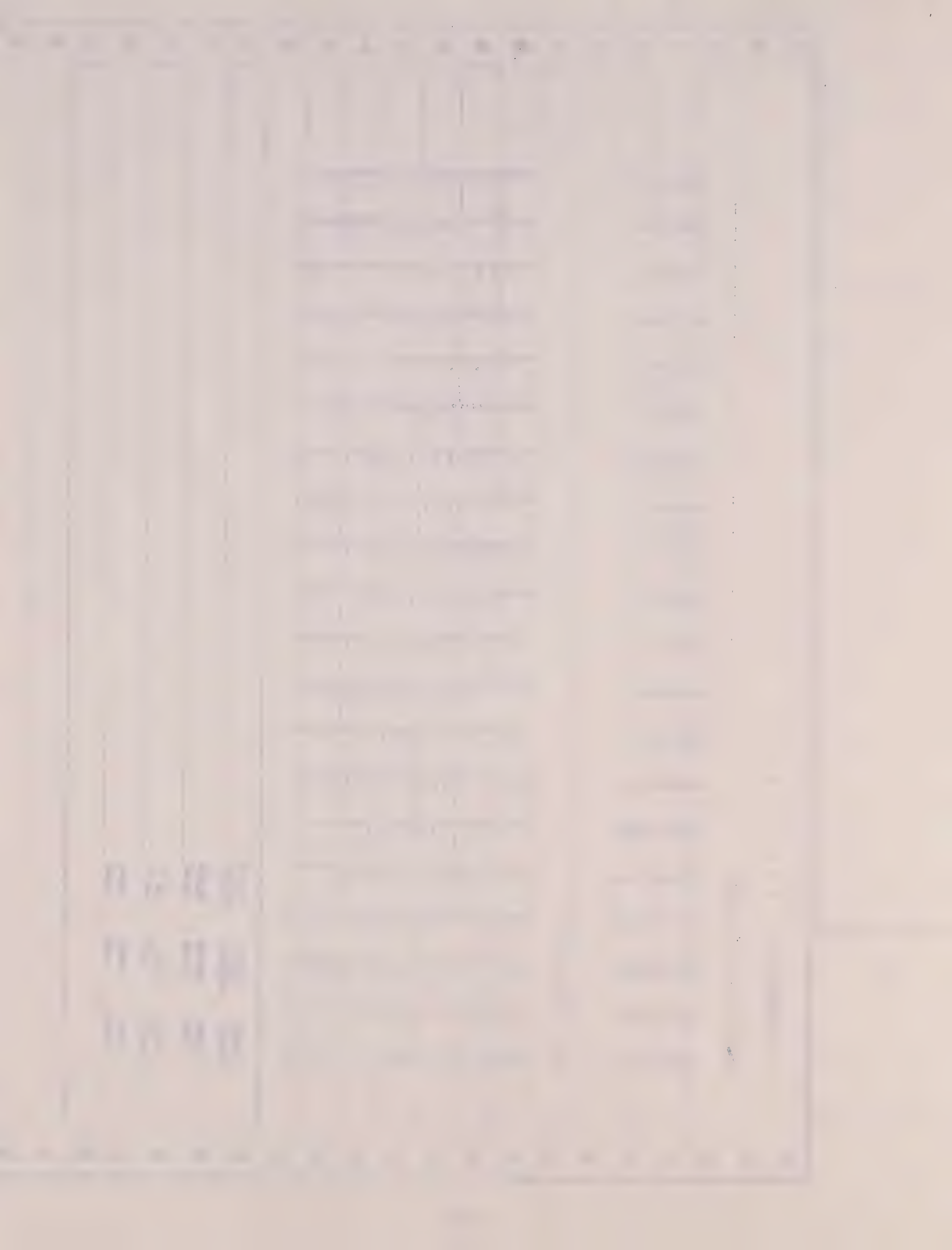
THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	0.	0.	1.	0.	1.	0.	1.	0.	1.	1.	1.	1.
0.	0.	1.	1.	0.	0.	1.	0.	1.	0.	0.	0.	1.	0.	0.	0.	1.	1.	0.	0.
0.	0.	1.	1.	1.	1.	0.	1.	1.	1.	1.	1.	0.	1.	0.	1.	1.	0.	1.	0.
1.	0.	0.	1.	1.	0.	1.	1.	0.	0.	1.	1.	1.	0.	1.	1.	0.	1.	1.	1.
0.	1.	0.	0.	1.	0.	0.	1.	0.	1.	1.	0.	0.	0.	1.	1.	1.	0.	0.	1.
0.	0.	0.	0.	1.	0.	1.	1.	1.	0.	0.	0.	0.	0.	1.	1.	0.	1.	0.	0.
0.	0.	0.	0.	1.	0.	0.													

CC/C CORRELATION

-1	-2	-1	-2	-3	-4	-5	-4	-3	-4	-5	-2	3	0	3	0	-1	-6	-5	-4
-5	0	-3	0	1	2	-7	-4	3	-8	3	-2	3	-4	9	2	3	6	1	0
-3	0	-1	-8	1	-2	3	-4	5	2	-3	-6	-7	4	7	6	-3	-6	-3	6
-7	-6	5	-6	8	6	-5	2	5	2	-9	-8	-5	6	5	2	-3	-6	3	-4
1	-2	5	0	-7	2	-1	-2	-9	-4	-5	-10	3	-4	1	-4	7	-4	7	6
-5	-2	-1	2	-5	4	3	4	5	0	-1	-4	-1	-4	1	4	3	2	3	6
3	2	1	0	1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	1	0	1	2	3
4	3	2	3	4	1	-4	-1	-4	-1	0	5	4	3	4	-5	2	-1	-2	-3
0	7	-4	7	-8	1	-4	3	-10	-3	-4	-4	-2	-1	2	-7	0	5	-2	1
-4	3	-6	-3	2	5	6	-5	-8	-9	2	5	2	-5	5	3	-6	5	-6	-7
4	-2	-6	-3	8	7	4	-7	-6	-3	2	5	-4	3	-2	1	-6	-1	6	-3
0	1	8	3	2	9	-4	3	-2	3	-8	3	-8	-7	2	1	0	-3	4	-5
-4	-5	-6	-1	0	3	0	3	-2	-5	-4	-3	-4	-5	-4	-3	-2	-1	-2	-1

SUM1	SUM2	SUM3
403.00	120.00	463.00
MEAN1	MEAN2	MEAN3
3.67	1.00	3.67
MS1	MS2	MS3
18.79	1.00	18.79
VAR1	VAR2	VAR3
5.28	.09	5.28



TAP NUMBERS ARE 7 6 5 4 2 1

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	1.	1.	0.	0.	1.	0.	1.	1.	0.	0.	0.	1.
1.	0.	0.	1.	1.	0.	1.	1.	0.	1.	0.	0.	0.	1.	1.	1.	1.	1.	0.	0.
0.	0.	1.	1.	1.	0.	0.	0.	1.	0.	1.	0.	0.	1.	1.	0.	0.	0.	0.	0.
0.	1.	1.	0.	1.	0.	1.	1.	1.	0.	1.	0.	0.	1.	0.	1.	0.	1.	0.	1.
1.	0.	1.	1.	1.	0.	0.	1.	0.	0.	0.	0.	1.	0.	0.	0.	1.	0.	0.	1.
0.	0.	1.	1.	1.	1.	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	1.	1.	1.
1.	0.	0.	1.	1.	1.	0.													

CC/C CORRELATION

-1	0	1	2	1	0	1	4	1	2	3	6	1	-2	-3	0	-3	0	-7	-10
-3	4	3	4	-7	6	5	2	-1	-2	1	2	-1	-6	-9	2	5	-8	-3	-8
-11	-10	3	4	5	6	5	-4	-1	-6	5	8	-7	2	1	-6	5	2	-3	4
-9	0	-5	4	-7	8	-5	2	-3	-6	5	-2	-5	6	-9	-6	5	0	3	-6
-7	-6	-5	-4	9	10	7	2	7	-6	-3	8	5	0	-3	-2	1	0	-3	-6
-7	0	-5	-4	-5	2	9	6	-1	2	-1	2	1	-2	-7	-8	-3	-2	-5	-2
-1	-2	-3	-2	-1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	-1	-2	-3	-2	-1
-6	[illegible]	-2	-3	-4	-7	-2	1	2	-1	2	-1	6	9	2	-5	-4	-5	6	-7
-6	-3	0	1	-2	-3	0	5	8	-3	-6	7	2	7	10	9	-4	-5	-6	-7
-6	0	0	5	-6	-9	6	-3	-2	5	-6	-3	2	-5	8	-7	4	-5	8	-9
4	-3	2	5	-6	1	2	-7	8	5	-6	-1	-4	5	6	5	4	3	-10	-11
-8	-3	-8	5	2	-9	-6	-1	2	1	-2	-1	2	5	6	-7	4	3	5	-5
-10	-7	0	-3	0	-3	-2	1	6	3	2	1	4	1	0	1	2	1	0	-1

SUM1	SUM2	SUM3
507.00	126.00	507.00

MEAN1	MEAN2	MEAN3
4.02	1.00	4.02

MS1	MS2	MS3
23.36	1.00	23.36

VAR1	VAR2	VAR3
7.17	.00	7.17

TAP NUMBERS ARE 7 6 5 3 2 1

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	1.	1.	1.	0.	0.	1.	1.	1.	1.	0.	1.	0.
0.	0.	0.	0.	1.	0.	1.	0.	1.	1.	1.	1.	0.	0.	1.	0.	0.	1.	0.	0.
0.	1.	0.	0.	0.	0.	1.	0.	0.	1.	1.	1.	0.	1.	1.	0.	1.	0.	1.	0.
1.	0.	0.	1.	0.	1.	1.	1.	0.	1.	0.	1.	1.	0.	0.	0.	0.	0.	0.	1.
1.	0.	1.	0.	1.	1.	0.	0.	0.	1.	1.	1.	0.	0.	0.	1.	1.	1.	1.	1.
1.	0.	0.	0.	1.	0.	1.	1.	0.	1.	1.	1.	0.	0.	1.	1.	0.	0.	1.	1.
0.	1.	0.	0.	1.	1.	0.													

LC/C CORRELATION

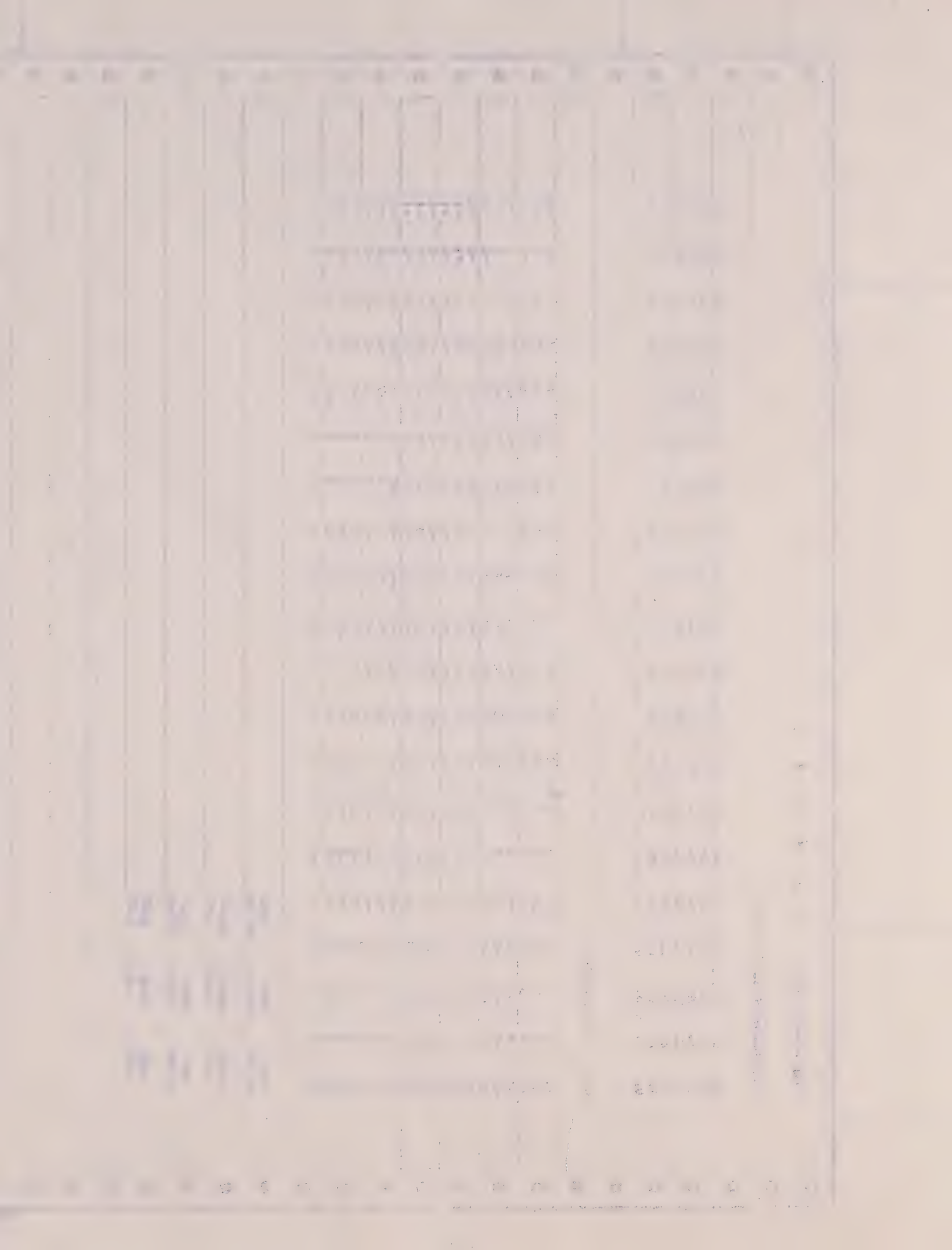
-1	9	1	0	-1	0	-1	2	-1	-2	1	2	-3	-2	-3	0	1	4	-1	-6
1	0	5	2	-11	2	3	-2	-1	0	5	6	5	-2	-7	4	7	-4	1	-6
-5	-8	5	4	1	2	3	-6	-5	-10	1	4	-11	-4	-3	-8	5	2	-3	4
-7	8	-7	6	-9	6	-5	2	-3	-4	7	2	3	10	-5	-2	9	4	5	-8
-3	-2	-5	-4	3	8	3	-2	3	-8	-3	6	1	-6	-9	-6	-1	0	1	-4
-3	10	-3	-8	-7	-2	5	0	-5	-2	-1	2	1	2	-3	-2	1	0	-3	0
-1	0	-1	-2	-1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	-1	-2	-1	0	-1
0	-3	0	1	-2	-3	2	1	2	-1	-2	-5	0	5	-2	-7	-6	-3	10	-3
-4	1	0	-1	-6	-4	-6	1	6	-5	-8	3	-2	5	8	3	-6	-5	-2	-3
-4	5	-4	-4	-2	-5	10	-3	2	7	-4	-3	2	-5	6	-9	6	-7	8	-7
-4	-3	2	3	-8	-3	-4	-11	4	1	-10	-5	-6	3	2	1	-4	5	-4	-6
-2	1	-4	-7	-4	-7	-2	-5	-8	-5	0	-1	-2	-3	-2	-11	-2	-5	-6	-1
-2	-1	-4	-1	0	-3	-2	-3	-2	-1	-2	-1	-2	-1	0	-1	0	-1	0	-1

SUM1	SUM2	SUM3
501.00	126.00	501.00

MEAN1	MEAN2	MEAN3
3.96	1.00	3.96

NS1	NS2	NS3
20.98	1.00	20.98

VAR1	VAR2	VAR3
7.59	.00	7.59



TAP NUMBERS ARE 7 5 4 3 2 1

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	1.	1.	1.	1.	1.	0.	0.	0.	1.	1.	1.	0.
1.	0.	1.	0.	1.	0.	0.	1.	0.	1.	0.	1.	1.	1.	1.	0.	1.	0.	0.	1.
1.	0.	0.	1.	1.	1.	0.	0.	1.	1.	0.	1.	0.	1.	1.	0.	0.	0.	1.	0.
0.	0.	1.	0.	1.	1.	1.	0.	1.	1.	0.	0.	1.	0.	0.	0.	0.	1.	1.	1.
1.	0.	0.	1.	0.	1.	1.	0.	1.	1.	1.	0.	0.	0.	0.	0.	1.	0.	1.	0.
0.	0.	1.	1.	0.	1.	1.	0.	1.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
0.	1.	0.	0.	1.	0.	0.													

CL/L CORRELATION

-1	-2	-1	-2	-3	-2	-3	-2	-3	-8	-3	-2	-7	-2	-1	-4	-5	-10	-9	-4
-3	0	3	-2	-5	-8	1	0	-1	6	-3	-4	-1	-6	-3	-10	-5	-10	5	-4
1	4	5	-10	-3	0	-1	2	-1	-4	0	-8	1	-4	5	-2	-5	2	-1	1
3	-10	-9	0	9	-4	-5	0	-3	4	1	-6	5	-2	7	-10	3	0	-3	0
-1	2	9	-6	-5	-2	3	-6	9	4	9	2	5	0	3	2	-7	0	-1	-2
7	4	1	-8	-1	2	3	4	9	4	3	0	1	0	1	2	7	2	1	2
1	2	1	0	1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	1	0	1	2	1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	1	0	1	2	1	2
4	2	2	7	2	1	1	1	1	4	4	9	8	3	2	-1	-4	1	4	7
-2	-1	0	-7	2	-3	-1	-5	2	-9	-4	-9	-6	3	-2	-5	-6	-9	2	-1
0	-3	0	3	-10	0	-2	3	-6	1	4	-5	0	-5	-4	-9	-8	-3	-10	3
1	0	2	-1	1	5	-4	1	-8	9	-4	-1	2	-1	0	-3	-10	5	4	1
-4	5	-10	-1	-10	-3	-6	-1	-4	-3	6	-1	0	1	-8	-5	-2	3	0	-3
-4	-9	-10	-3	-4	-1	-2	-7	-2	-3	-8	-3	-2	-3	-2	-3	-2	-1	-2	-1

SUM1	SUM2	SUM3
467.00	20.00	467.00

MEAN1	MEAN2	MEAN3
3.7	1.00	3.71

MS1	MS2	MS3
21.99	1.00	21.99

VAR1	VAR2	VAR3
8.26	.00	8.26

C-9

TAP NUMBERS ARE 7 6 5 4 3 2

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	0.	1.	0.	0.	1.	0.	0.	0.	0.	1.	1.	0.
0.	0.	0.	0.	0.	1.	0.	1.	1.	0.	1.	1.	0.	0.	0.	1.	0.	1.	0.	0.
0.	0.	0.	1.	1.	1.	0.	1.	1.	0.	1.	0.	0.	1.	1.	1.	1.	0.	0.	0.
0.	1.	0.	0.	1.	1.	0.	1.	1.	1.	0.	1.	0.	0.	0.	1.	0.	0.	0.	1.
1.	0.	1.	0.	1.	1.	0.	0.	1.	1.	1.	0.	0.	1.	1.	0.	0.	1.	0.	1.
1.	1.	1.	0.	1.	0.	1.	0.	0.	1.	0.	1.	0.	1.	0.	1.	1.	1.	0.	0.
0.	1.	1.	1.	1.	1.	0.													

CODE CORRELATION

-1	0	1	2	3	4	3	4	1	-2	1	0	-5	2	3	2	-1	-2	-5	0
-1	0	3	-4	-9	-8	3	4	3	10	1	0	3	-2	-1	-6	-3	-6	9	-2
-1	2	5	-14	-3	0	-1	4	-1	-8	7	-10	-1	-6	1	-2	-5	3	-1	6
3	-5	-9	6	7	-4	-7	0	-5	2	1	-2	5	0	9	-8	7	0	-5	0
-1	2	11	-6	-3	0	1	-10	5	2	3	0	1	-4	-1	-2	-11	-4	-5	-4
7	5	3	-4	-1	0	-1	4	3	0	-3	-4	-3	4	-1	-2	1	-2	-3	-4
-5	-4	-3	-2	-1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	-1	-2	-3	-4	-5
-5	-5	-2	1	-2	-1	4	-3	-4	-3	0	3	4	-1	0	-1	-4	3	8	7
-4	-5	-4	-11	-2	-1	-4	1	0	5	2	5	-10	1	0	-3	-6	11	2	-1
0	-5	0	7	-6	9	0	5	-2	1	2	-5	0	-7	-4	7	8	-9	-8	3
0	-1	4	-3	-2	1	-6	-1	-10	7	-8	-1	0	-1	0	-3	-12	5	2	-1
-2	9	-5	-3	-6	-1	-2	3	0	1	10	5	4	3	-8	-9	-4	3	0	-1
0	-3	-4	-1	2	3	2	-5	0	1	-2	1	5	3	4	3	2	1	0	-1

SUM1	SUM2	SUM3
443.00	120.00	443.00
MEAN1	MEAN2	MEAN3
3.52	1.00	3.52
MS1	MS2	MS3
20.69	1.00	20.69
VAR1	VAR2	VAR3
8.33	.00	8.33

TAP NUMBERS ARE 7 6 4 2

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	0.	1.	1.	1.	1.	1.	0.	1.	1.	0.	1.	1.
1.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.	0.	0.	0.	1.	1.	0.	1.	1.	0.
0.	1.	0.	0.	0.	0.	0.	1.	1.	1.	1.	0.	0.	0.	1.	0.	1.	1.	0.	1.
0.	1.	1.	0.	0.	0.	0.	1.	0.	0.	0.	1.	0.	0.	1.	1.	0.	1.	1.	0.
1.	1.	0.	1.	0.	0.	0.	1.	1.	0.	0.	1.	1.	0.	1.	0.	1.	0.	1.	0.
0.	0.	1.	1.	1.	0.	0.	1.	0.	1.	0.	1.	0.	1.	1.	1.	0.	1.	0.	1.
0.	0.	1.	0.	0.	1.	0.													

LC/C CORRELATION

-1	0	-1	-2	-1	-2	-3	0	-3	-2	1	-2	-1	0	1	-2	1	4	-5	0
-1	-5	3	2	5	2	-1	2	9	-2	-1	0	-1	0	1	2	-5	-10	7	2
-3	-4	3	-10	7	-6	-3	2	11	2	7	6	1	-2	1	-6	-1	2	7	-8
-3	0	-9	0	-9	2	7	-8	-3	0	7	-2	1	-2	-7	-6	-3	-12	3	2
0	-8	9	-4	1	4	-3	-8	9	4	-3	-2	-5	0	-1	0	1	-10	-3	0
-3	-0	-3	-0	3	0	-1	4	-5	-2	1	-2	-5	0	1	-2	1	2	-1	2
1	0	1	0	-1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	-1	0	1	0	1
2	-1	2	1	-2	1	0	-5	-2	1	-2	-5	4	-1	0	3	-4	-3	-6	-3
0	-3	-10	1	0	-1	0	-5	-2	-3	4	9	-6	-3	4	1	-4	9	-6	-3
2	-3	-12	-3	-8	-7	-2	1	-2	7	0	-3	-6	7	2	-9	6	-9	8	-3
-6	7	2	-1	-8	1	-2	1	6	7	2	11	2	-3	-6	7	-10	3	-2	-3
2	7	-10	-0	2	1	4	-1	0	-1	-2	9	2	-1	2	3	2	3	-4	-1
0	-0	4	1	-2	1	4	-1	-2	1	-2	-3	0	-3	-2	-1	-2	-1	0	-1

SUM1	SUM2	SUM3
429.00	1.00E+00	429.00

MEAN1	MEAN2	MEAN3
0.40	1.00	0.40

MS1	MS2	MS3
20.18	1.00	20.18

VAR1	VAR2	VAR3
0.39	.00	0.39

(C-11)

TAP NUMBERS ARE 7 5 3 1

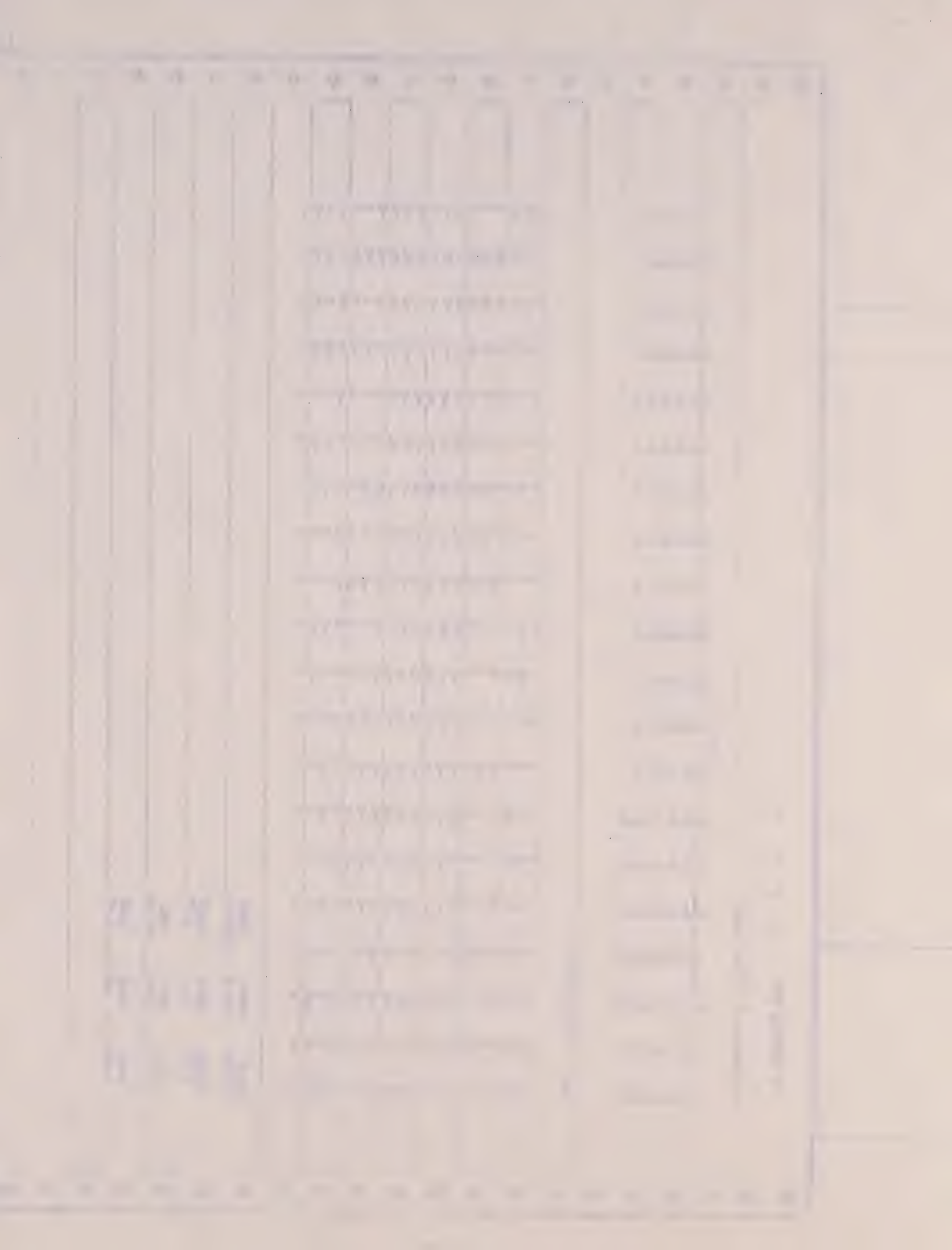
THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	1.	0.	0.	1.	0.	0.	1.	0.	1.	0.	1.	1.
1.	0.	1.	0.	1.	0.	1.	0.	0.	1.	1.	1.	0.	0.	0.	1.	1.	0.	0.	1.
0.	1.	1.	0.	0.	1.	1.	0.	0.	0.	1.	0.	1.	1.	1.	1.	0.	1.	1.	1.
0.	0.	1.	0.	0.	0.	1.	0.	0.	0.	0.	1.	1.	0.	1.	0.	1.	1.	0.	1.
0.	0.	0.	1.	1.	1.	1.	0.	0.	0.	0.	0.	1.	0.	0.	1.	1.	0.	1.	1.
0.	0.	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.	0.	1.	1.	1.	0.	1.	1.	0.
1.	1.	1.	1.	1.	0.	0.													

CCF/L CORRELATION

-1	-2	-1	0	1	2	3	4	5	4	5	2	1	4	3	-4	-1	0	-9	-6
-5	-6	1	-2	1	-2	-3	0	7	-6	-1	6	1	6	1	0	-5	-12	1	-4
-9	-4	5	-6	9	-4	-1	2	7	-2	3	0	-3	-4	1	-6	-1	2	-9	-8
-1	0	-9	6	-9	0	7	-10	-3	0	5	-2	3	2	-1	-4	1	-8	-3	0
3	-10	7	-6	3	6	3	-2	11	4	-1	-2	-7	-2	-5	0	5	-8	-1	2
1	-2	1	-2	7	4	5	8	-1	0	3	-4	-5	-2	-3	-6	-5	-6	-5	-4
-3	-2	-1	6	1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	1	0	-1	-2	-3
-4	-5	-6	-5	-6	-3	-2	-5	-4	3	0	-1	8	5	4	7	-2	1	-2	1
6	-1	-9	5	0	-5	-2	-7	-2	-1	4	11	-2	3	8	3	-6	7	-10	3
0	-3	-8	1	-4	-1	2	3	-2	5	0	-3	-10	7	0	-9	8	-9	8	-1
-8	9	2	-1	-6	1	-4	-3	9	3	-2	7	2	-1	-4	9	-8	5	-4	-9
-4	1	-12	-5	8	1	6	1	4	-1	-6	7	0	-3	-2	1	-2	1	-8	-5
-5	-7	0	-1	-4	3	4	1	2	5	4	5	4	3	2	1	0	-1	-2	-1

SUM1	SUM2	SUM3
471.00	160.00	471.00
MEAN1	MEAN2	MEAN3
3.74	1.00	3.74
MS1	MS2	MS3
22.37	1.00	22.37
VAR1	VAR2	VAR3
8.40	.00	8.40



TAP NUMBERS ARE 7 8

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	1.	1.	1.	0.	1.	0.	0.	1.	1.	0.	0.	1.
1.	1.	0.	1.	1.	1.	0.	1.	0.	0.	1.	0.	1.	1.	0.	0.	0.	1.	1.	0.
1.	1.	1.	1.	0.	1.	1.	0.	1.	0.	1.	1.	0.	1.	1.	0.	0.	1.	0.	0.
1.	0.	0.	0.	1.	1.	1.	0.	0.	0.	0.	1.	0.	1.	1.	1.	1.	1.	0.	0.
1.	0.	1.	0.	1.	1.	1.	0.	0.	1.	1.	0.	1.	0.	0.	1.	0.	0.	1.	1.
1.	1.	1.	0.	0.	0.	1.	0.	1.	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.
1.	0.	0.	0.	0.	0.	0.													

CC/S CORRELATION

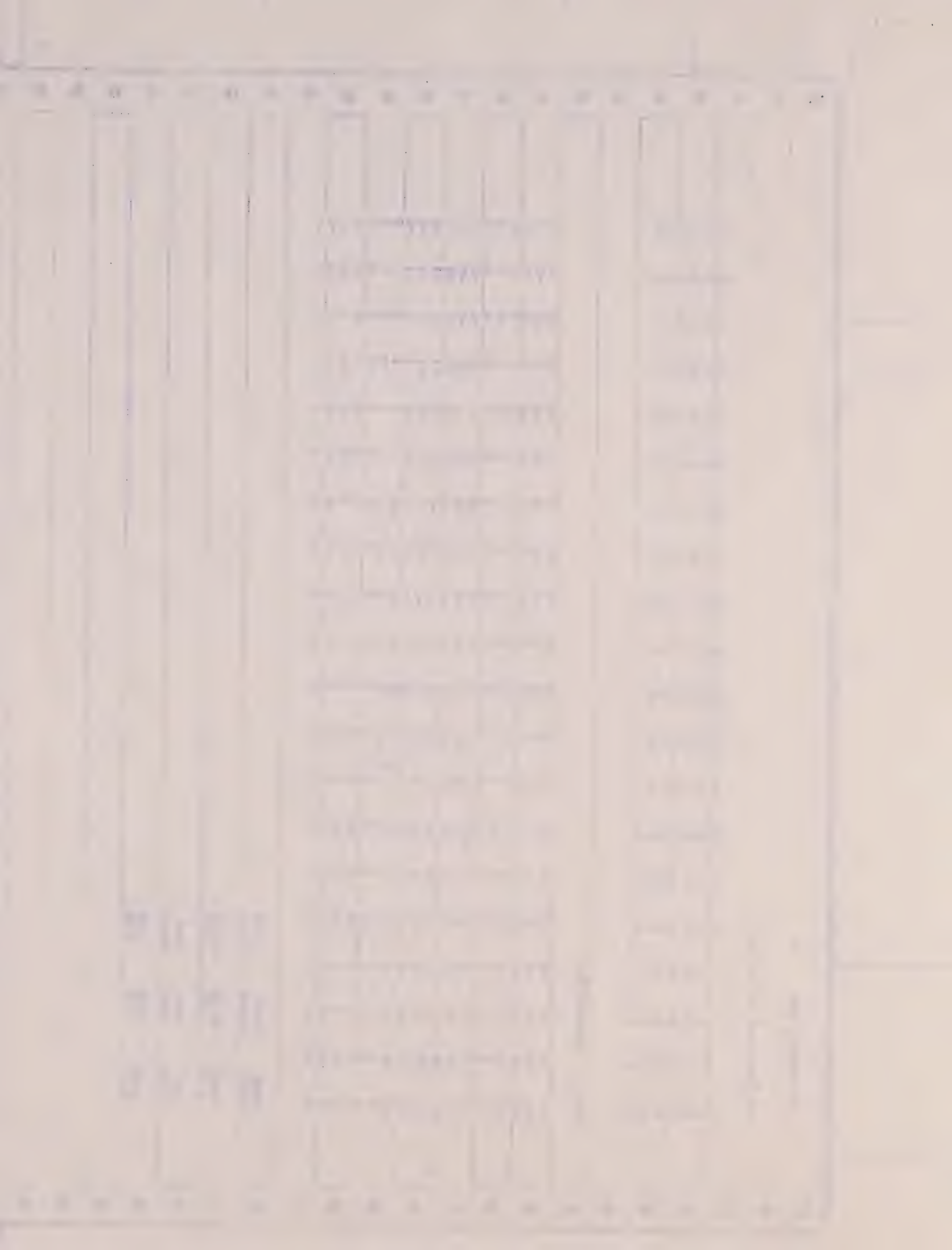
-1	-2	-3	-4	-5	-6	-5	-4	-5	-4	-5	-4	-3	-4	1	-4	-1	-4	3	-4
-3	-2	-1	-6	-2	-4	-1	-4	5	-2	3	-4	-1	-2	-7	-6	5	-2	-3	2
-1	-4	1	-4	-1	6	3	-8	-9	-2	7	-4	3	-8	-1	-6	3	-6	-5	-8
-3	4	-9	8	-8	2	7	4	-7	-4	5	6	7	-4	3	-8	1	8	7	14
-7	0	3	-2	7	0	-3	2	1	-6	5	6	1	0	3	-4	1	-6	3	8
3	-4	5	0	1	-4	5	-4	3	0	-3	-2	-3	-3	-3	-4	-3	-4	-3	-8
5	4	3	2	1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	1	2	3	4	5
4	3	4	3	4	3	2	3	-2	3	0	3	-4	3	4	1	0	3	4	3
0	-3	-6	1	-4	3	0	1	6	5	-6	1	-2	-3	0	7	-2	3	0	-7
-4	7	8	1	-8	3	-4	7	0	5	-4	-7	4	7	2	-5	8	-9	4	-3
-8	-3	6	3	-6	-1	-8	3	-4	7	-2	-9	-8	3	6	-1	-4	1	-8	-1
-2	-3	-2	-5	-6	-7	-2	-1	-4	3	-2	-5	-8	-1	-9	-8	-6	-1	-2	-5
-6	3	-4	-1	-4	1	-4	-3	-4	-5	-4	-5	-4	-5	-6	-5	-4	-3	-2	-1

SUM1	SUM2	SUM3
476.00	120.00	472.00

MEAN1	MEAN2	MEAN3
3.79	1.00	3.75

MS1	MS2	MS3
19.07	1.00	19.07

VAR1	VAR2	VAR3
4.98	.00	4.98



TAP NUMBERS ARE 7 6

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	1.
1.	0.	0.	0.	0.	1.	0.	1.	0.	0.	0.	1.	1.	1.	1.	0.	0.	1.	0.	0.
0.	1.	0.	1.	1.	0.	0.	1.	1.	1.	0.	1.	0.	1.	0.	0.	1.	1.	1.	1.
1.	0.	1.	0.	0.	0.	1.	1.	1.	1.	0.	0.	0.	1.	0.	0.	1.	0.	0.	1.
1.	0.	1.	1.	0.	1.	0.	1.	1.	0.	1.	1.	1.	1.	0.	1.	1.	0.	0.	0.
1.	1.	0.	1.	0.	0.	1.	0.	1.	1.	1.	0.	1.	1.	1.	0.	0.	1.	1.	0.
0.	1.	0.	1.	0.	1.	0.													

CC/C CORRELATION

1	0	-1	0	-1	0	-1	0	-1	2	-1	0	-1	0	7	0	3	2	9	0
1	2	3	2	-5	-4	-1	-6	8	-4	-1	-4	-1	0	-3	0	11	2	1	6
1	-2	-1	-5	1	6	1	-6	-7	0	7	-6	-1	-12	-7	-14	-3	2	-5	-4
-1	4	-4	8	-5	0	3	4	-3	2	13	6	11	0	5	-8	-1	6	8	-2
-7	-2	3	0	5	-2	-9	-2	-5	-12	-1	2	-1	0	3	0	3	-8	5	0
3	0	1	-4	-3	-2	-1	-10	-3	-4	-1	-8	-1	0	-1	0	-3	0	-1	0
-1	0	-1	0	-1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-2	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	-1	0	-1	0	-1
-1	-1	0	-3	0	-1	0	-1	-8	-1	-4	-3	-10	-1	-2	-3	-4	1	-4	-3
0	0	-4	3	0	3	0	-1	2	-1	-12	-1	-2	-9	-2	-5	0	3	-2	-7
-2	-2	0	-1	-8	5	0	13	6	15	2	-3	-4	3	0	-5	-8	-9	-4	-1
-3	-3	-2	-3	-14	-7	-12	-1	-6	-7	0	-7	-6	1	6	1	-4	-1	-6	1
-8	-1	-2	-11	0	-3	0	-1	-4	-1	-4	-3	-5	-1	-4	-5	-2	-3	-2	-1
0	-3	-2	-3	0	-7	0	-1	0	-1	-2	-1	0	-1	0	-1	0	-1	0	-1

SUM1	SUM2	SUM3
399.00	128.00	399.00

MEAN1	MEAN2	MEAN3
3.17	1.00	3.17

NS1	NS2	NS3
20.31	1.00	20.31

VAR1	VAR2	VAR3
10.26	.00	10.26

TAP NUMBERS ARE 7 6 3 1

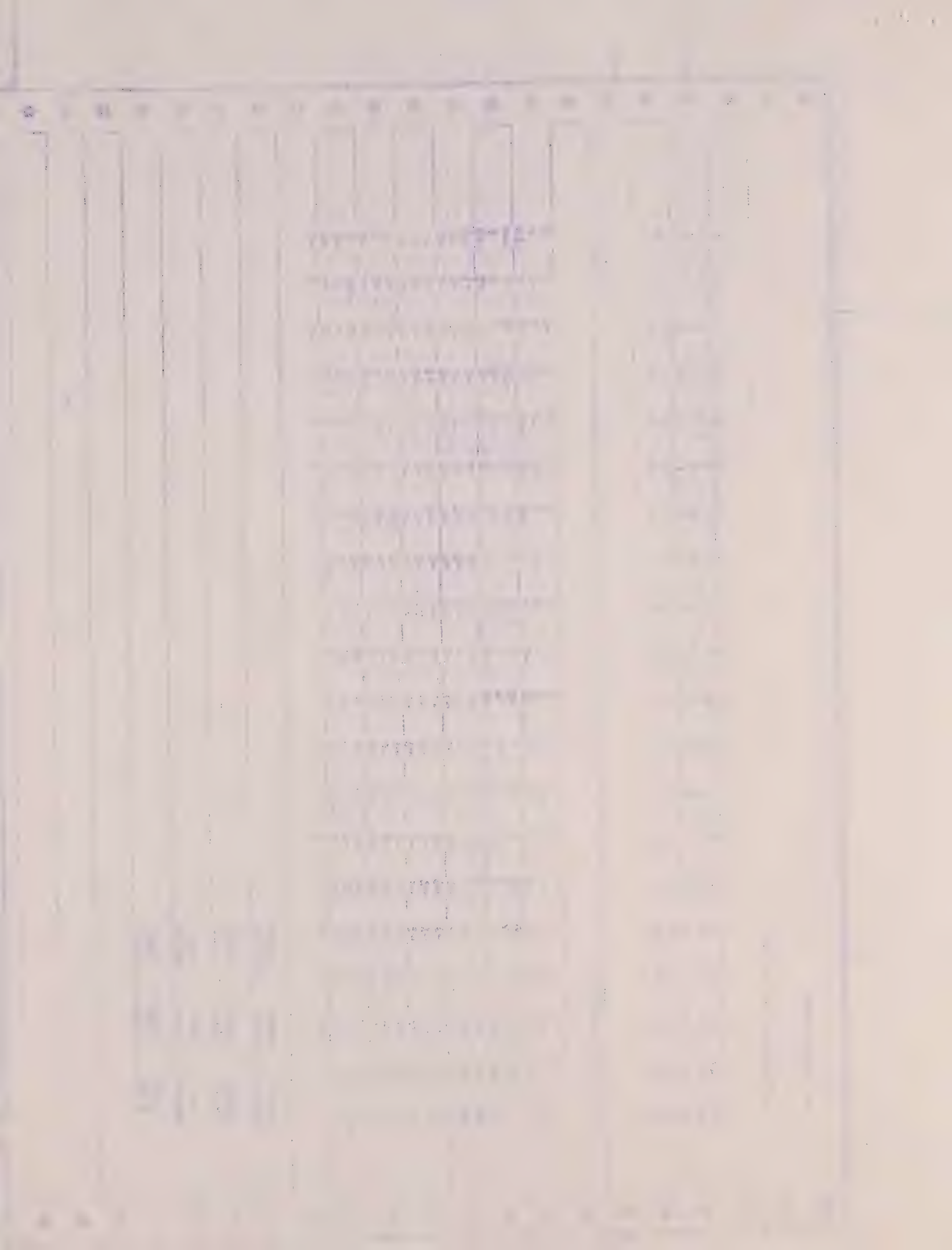
THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	1.	0.	0.	1.	1.	1.	0.	0.	0.	1.	1.	0.
1.	0.	0.	0.	0.	1.	0.	1.	0.	0.	1.	0.	1.	0.	0.	1.	1.	0.	0.	1.
0.	1.	0.	1.	0.	1.	1.	0.	0.	0.	1.	0.	0.	0.	0.	1.	1.	0.	0.	1.
1.	1.	1.	1.	0.	0.	1.	1.	1.	0.	0.	1.	0.	0.	1.	0.	0.	0.	1.	1.
0.	0.	1.	1.	0.	1.	1.	1.	1.	0.	0.	0.	0.	0.	1.	1.	1.	1.	0.	1.
0.	1.	0.	0.	0.	1.	0.	1.	1.	1.	0.	0.	0.	1.	1.	1.	1.	0.	1.	1.
1.	0.	1.	1.	0.	1.	0.	1.	1.	1.	0.	0.	1.	1.	1.	1.	0.	1.	1.	

CC/C CORRELATION

-1	0	-1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
-7	4	-3	2	3	-4	-7	-10	-1	2	3	6	-11	4	-11	-4	-1	8	-1	8
-9	-6	9	0	5	0	3	6	-3	10	-7	2	1	-6	-5	-10	1	-2	1	-16
7	-10	-7	6	9	-8	9	-2	1	-2	8	4	6	-2	-3	6	-11	2	-7	4
-3	-4	-3	-10	7	4	-1	0	-1	0	3	10	-5	10	-7	-4	-3	0	9	6
-1	-2	-1	0	-1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-2	-7	2	-5	-2
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-2	-5	-2	-7	-2	-3	-8	-3	-4	-5	-2	5	-4	-3	6	-5	2	-3	-4	-5
0	4	0	-5	-8	-7	10	-5	10	3	0	-1	0	-1	4	7	-10	-7	6	-1
-4	-7	-4	-11	6	-3	-2	5	-4	9	-2	1	-2	9	-8	9	6	-7	-10	7
-10	1	-2	1	-10	-5	-6	1	2	-9	10	-3	6	3	0	5	6	9	-8	-5
0	-1	0	-1	-4	-11	4	-11	6	3	2	-1	-10	-7	-4	3	2	-5	-4	-7
-2	3	-6	4	-4	-5	-2	-7	-2	-1	-6	-1	-4	-1	-3	-1	-6	-1	0	-1

SUM1	SUM2	SUM3
521.00	128.00	521.00
MEAN1	MEAN2	MEAN3
4.13	1.00	4.13
MS1	MS2	MS3
20.00	1.00	20.00
VAR1	VAR2	VAR3
4.50	.00	4.50



TAP NUMBERS ARE 7 6 4 1

THE FOLLOWING IS THE CODE

1.	1.	1.	1.	1.	1.	1.	0.	1.	0.	1.	1.	0.	1.	1.	1.	0.	1.	1.	1.
1.	0.	0.	0.	1.	1.	1.	0.	1.	0.	0.	0.	1.	0.	1.	0.	1.	1.	1.	0.
0.	0.	0.	0.	0.	1.	1.	1.	1.	0.	1.	1.	0.	0.	1.	1.	0.	0.	0.	1.
0.	0.	1.	0.	0.	1.	1.	1.	0.	0.	1.	1.	1.	1.	1.	0.	0.	1.	0.	0.
0.	0.	0.	1.	0.	0.	0.	1.	1.	0.	1.	0.	1.	0.	1.	0.	0.	1.	1.	0.
1.	1.	0.	1.	0.	0.	1.	0.	1.	0.	0.	0.	1.	0.	1.	1.	0.	0.	0.	0.
0.	1.	1.	0.	0.	1.	0.													

LC/C CORRELATION

-1	0	-1	-2	-2	0	-1	0	-5	0	-2	-2	-1	-4	-1	2	-1	-10	-1	-2
-9	0	-7	0	3	-4	-3	-10	3	6	3	4	-11	2	-9	-4	1	4	5	4
-3	-10	7	2	-1	-6	-3	0	-9	6	-11	0	-1	-6	-1	-4	7	4	5	-6
9	-6	-5	6	7	-10	3	-6	-5	-8	3	3	5	0	-1	10	-7	8	-1	2
5	0	-3	-8	9	2	-5	-6	-5	-2	3	8	-3	10	-5	-4	-7	-6	9	8
3	-8	-1	0	-1	8	1	0	9	0	-3	0	3	0	1	2	-1	4	-1	0
-1	0	1	0	-1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	-1	0	1	0	-1
0	-4	4	-1	2	1	0	3	0	-3	0	9	0	1	8	-1	6	-1	-4	3
2	9	-4	-7	-4	-5	10	-3	8	3	-2	-5	-6	-5	2	9	-8	-3	0	5
2	-1	8	-7	10	-1	0	5	0	3	-8	-5	-6	3	-10	7	4	-3	-8	9
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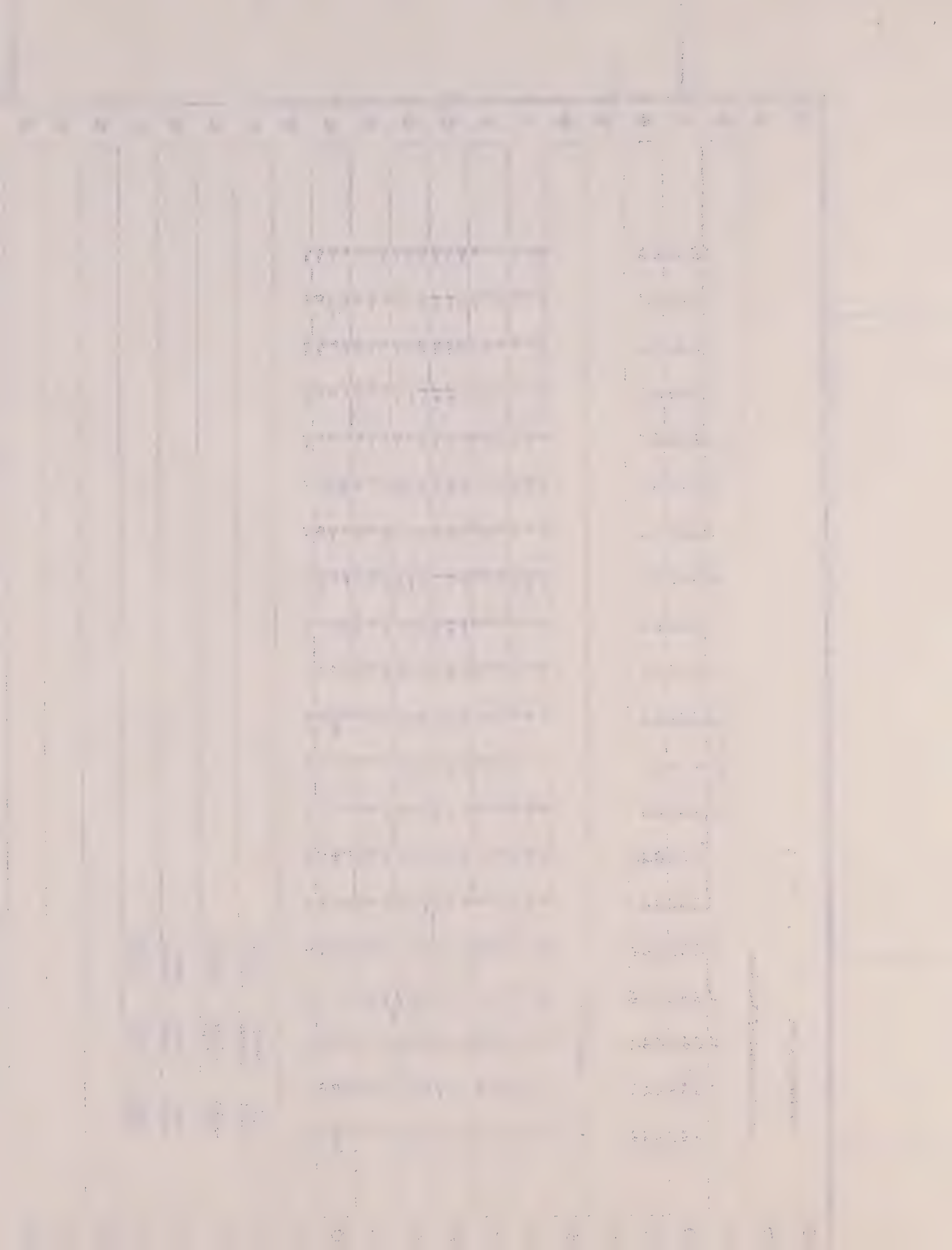
4	6	4	4	-4	-9	2	-11	4	3	6	3	-10	3	-4	3	0	-7	0	-4
-2	-1	-10	-1	2	-1	-4	-1	-2	0	0	-5	0	-1	0	-1	-2	-1	0	-1

SUM1	SUM2	SUM3
477.00	126.00	477.00

MEAN1	MEAN2	MEAN3
3.79	1.00	3.79

MS1	MS2	MS3
24.21	1.00	24.21

VAR1	VAR2	VAR3
9.80	.00	9.80



TAP NUMBERS ARE 7 6 5 2

THE FOLLOWING IS THE CODE

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0.	0.	0.	1.	0.	0.	1.	0.	0.	1.	1.	0.	0.	1.	1.	1.	1.	0.	0.	0.
1.	1.	1.	0.	1.	1.	1.	0.	1.	0.	1.	1.	1.	1.	0.	1.	0.	0.	1.	0.
1.	1.	0.	0.	1.	0.	1.	0.	0.	1.	1.	1.	0.	0.	1.	0.	0.	0.	1.	1.
0.	0.	0.	1.	0.	1.	1.	1.	0.	0.	0.	0.	1.	0.	0.	0.	0.	1.	1.	0.
1.	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	0.	1.	1.	0.	0.	0.	0.	0.	0.
1.	0.	1.	0.	1.	1.	0.													

CC/C . CORRELATION

-1	0	1	0	1	0	1	2	-1	-5	-3	-2	-7	-6	1	-4	3	8	3	8
-1	4	-3	4	-7	-2	-5	-4	-1	4	3	6	5	-4	-7	0	-5	-5	-7	8
-7	-8	-3	4	-5	-6	5	0	-3	6	-7	-8	9	0	1	-10	-3	0	3	0
1	-4	11	-12	3	-2	-1	-8	-1	2	9	-2	-1	-10	7	6	-7	2	-2	-6
5	4	-9	2	5	6	-1	5	3	4	-1	6	3	-6	-5	-4	-5	0	3	4
1	0	-5	2	-5	0	-9	-4	-1	-4	3	-2	5	6	1	2	5	0	-3	-2
-1	-2	-1	-2	-1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
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-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	127	0	-1	-2	-1	-2
-6	-3	0	5	2	1	6	5	-2	3	-8	-1	-4	-9	0	-5	2	-5	6	1
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-0	-1	2	-7	6	7	-10	-1	-2	9	2	-1	-4	-1	-2	3	-12	11	-4	1
0	3	0	-3	-10	1	0	9	-8	-7	6	-3	0	5	-6	-5	8	-3	-6	-7
0	-7	-4	-5	0	-7	-4	5	4	3	4	-1	-5	-5	-2	-7	4	-3	4	-1
0	3	0	0	-4	1	-6	-7	-2	-3	-6	-1	2	1	0	1	0	1	0	-1

SUM1	SUM2	SUM3
461.00	126.00	461.00
MEAN1	MEAN2	MEAN3
3.00	1.00	3.00
MS1	MS2	MS3
20.91	1.00	20.91
VAR1	VAR2	VAR3
7.53	.00	7.53

TAP NUMBERS ARE 7 5 2 1

THE FOLLOWING IS THE CODE

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0.	1.	0.	0.	0.	0.	1.	1.	1.	0.	1.	0.	0.	0.	1.	1.	0.	0.	0.	1.
0.	0.	1.	1.	1.	0.	0.	1.	0.	1.	0.	0.	1.	1.	0.	1.	0.	0.	1.	0.
1.	1.	1.	1.	0.	1.	0.	1.	1.	1.	0.	1.	1.	1.	0.	0.	0.	1.	1.	1.
1.	0.	0.	1.	1.	0.	0.	1.	0.	0.	1.	0.	0.	0.	1.	0.	1.	0.	1.	0.
1.	1.	0.	1.	1.	0.	0.													

SCAG CORRELATION

-1	-2	-1	0	-1	0	1	2	3	-2	1	4	-1	-2	3	-4	3	-4	5	0
-3	-2	-7	4	-7	0	-3	2	5	8	5	6	7	0	-5	8	-1	2	1	8
-3	-2	-1	10	-3	-4	9	4	1	10	-3	-8	9	0	5	-8	-3	0	1	2
-1	-8	9	-10	7	0	-3	-2	1	2	7	-6	1	-10	3	2	-11	-2	-5	-10
3	2	-11	0	1	2	-9	-2	-3	0	-5	4	-1	-8	-7	-6	-9	-6	-3	2
-1	0	-3	6	1	-4	-1	2	3	-2	3	-4	1	0	-5	-2	-1	-4	-2	-2
-1	0	-1	0	1	0	127	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
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-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
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-4	-3	-4	-5	-6	-7	-8	-1	-4	-5	-6	-7	-2	-3	-2	-9	-2	-1	0	-11
-12	-1	-2	-11	-2	-3	-10	-1	-6	-7	-2	-1	-2	-3	-8	-7	-10	-9	-8	-1
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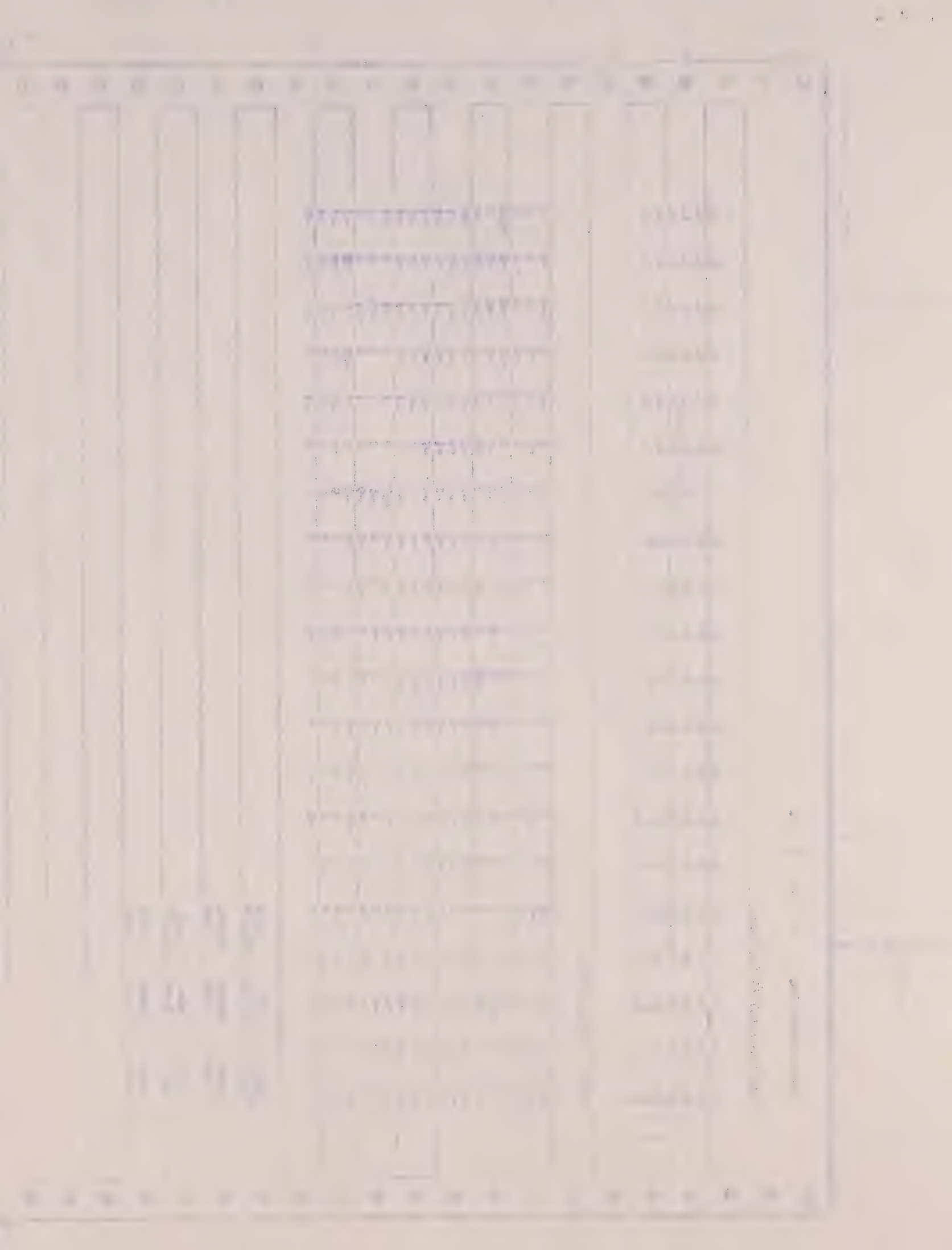
SUM1	SUM2	SUM3
651.00	126.00	651.00
MEAN1	MEAN2	MEAN3
5.00	1.00	5.00
MS1	MS2	MS3
21.77	1.00	21.77
VAR1	VAR2	VAR3
0.96	.00	0.96



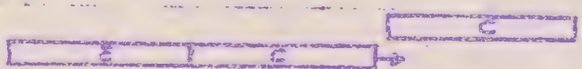
APPENDIX D

MAP NUMBERS-ARE 7 3 3 3

THE FOLLOWING IS THE CODE

CC CORRELATION

GUARD CORRELATION

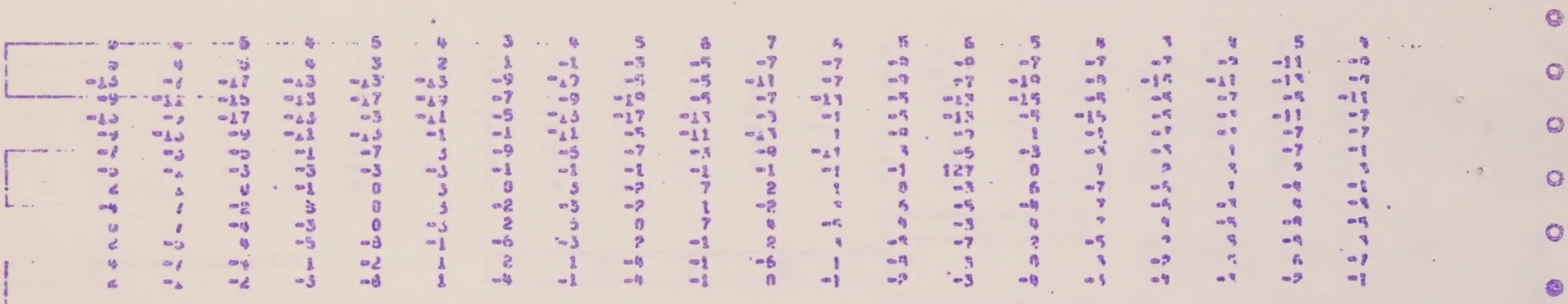


(CONTD. NEXT PAGE)

$B_i = 1$ $i = 1, 2, \ldots 127$
$B_i = 0$ $i = 1, 2, \ldots 127$
CONTD. NEXT PAGE

$B_i = 1, i = 1, 2, \ldots 127$
(CONTD. NEXT PAGE)

$B_i = 0$
$i = 1, 2, \cdots 127$
$B_i = 1$
$i = 1, 2, \cdots 127$
CONVOLUTION
CORRELATION
CONTD. NEXT PAGE



C

CBARB CORRELATION

C B

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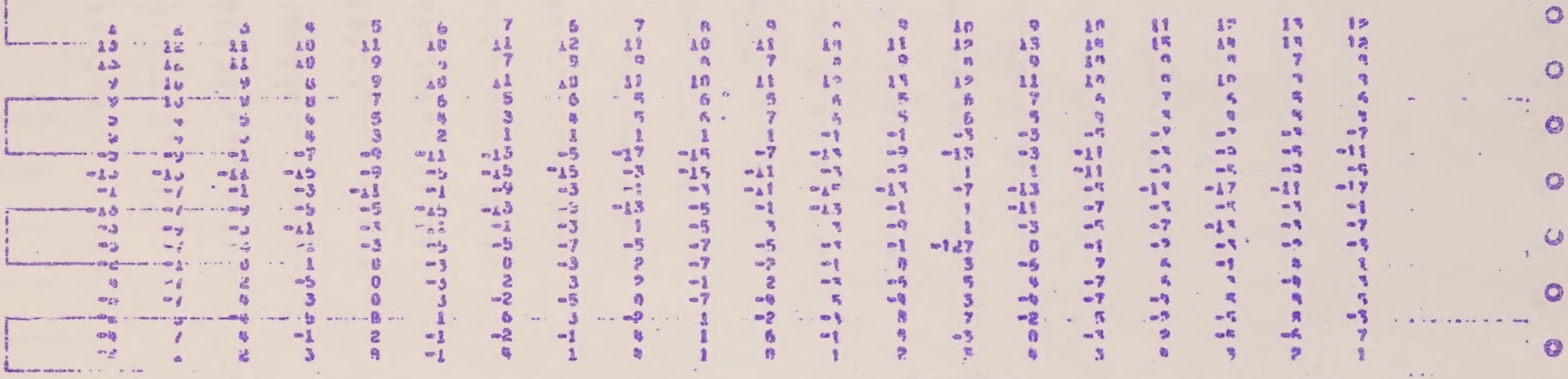
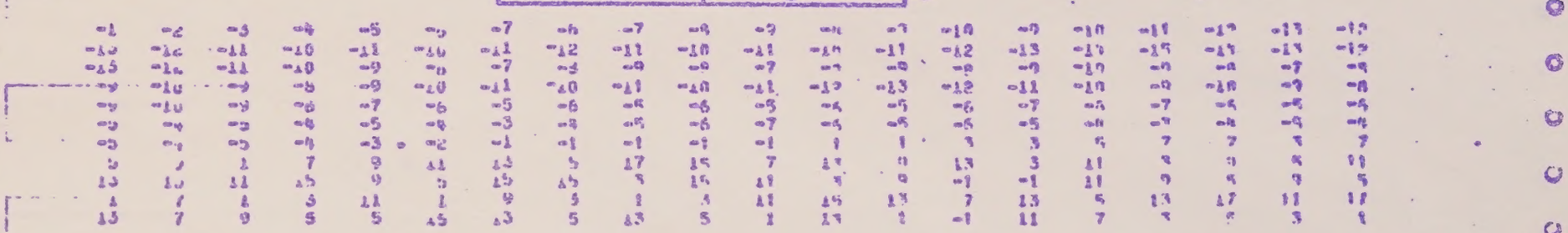


C

CBBAR CORRELATION

C B

$\bar{B}_i = 0 \quad ; i = 1, 2, \ldots 127$



(CONTD. NEXT PAGE)

$B_i = 0$; $i = 1, 2, \ldots, 127$
C
B
C